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Remedial Design/Remedial Action Scope of Work Test Area North Final Groundwater Remediation Operable Unit 1-07B



Idaho National Engineering and Environmental Laboratory

**Remedial Design/Remedial Action Scope of Work
Test Area North Final Groundwater Remediation
Operable Unit 1-07B**

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ACRONYMS

ARAR	applicable or relevant and appropriate requirement
ASTU	Air Stripper Treatment Unit
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COCs	contaminants of concern
D&D	decommission and dismantle
DCE	dichloroethene
DMP	data management plan
DOE	U.S. Department of Energy
DOE-ID	U.S. Department of Energy-Idaho Operations Office
DQO	data quality objectives
EPA	U.S. Environmental Protection Agency
FFA/CO	Federal Facility Agreement and Consent Order
FY	fiscal year
GWTF	Groundwater Treatment Facility
HASP	health and safety plan
IDEQ	Idaho Department of Environmental Quality
INEEL	Idaho National Engineering and Environmental Laboratory
ISB	in situ bioremediation
MCL	maximum contaminant level
MNA	monitored natural attenuation
MWP	MNA RA Work Plan
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPTF	New Pump-and-Treat Facility
O&M	operations and maintenance
OU	operable unit
PDO	pre-design operations
PM/CM	performance monitoring/compliance monitoring

QAPjP	quality assurance project plan
RA	remedial action
RAO	remedial action objective
RD/RA	Remedial Design/Remedial Action
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SO	start-up operations
SOW	Scope of Work
T&FR	technical and functional requirements
TAN	Test Area North
PCE	tetrachloroethene
TCE	trichloroethene
TSF	Technical Support Facility
VOCs	volatile organic compounds
WAG	waste area group

Remedial Design/Remedial Action Scope of Work Test Area North Final Groundwater Remediation Operable Unit 1-07B

1. PURPOSE

In accordance with the Idaho National Engineering and Environmental Laboratory (INEEL) Federal Facility Agreement and Consent Order (FFA/CO), the United States Department of Energy Idaho Operations Office (DOE-ID) submits the following Remedial Design/Remedial Action (RD/RA) Scope of Work (SOW) for the remediation of the Test Area North (TAN) Technical Support Facility (TSF) injection well (TSF-05) and surrounding groundwater contamination (TSF-23). These sites together have been designated as operable unit (OU) 1-07B. Figure 1-1 illustrates the location of the INEEL within Idaho and TAN within the INEEL. This remedial action (RA) will proceed in accordance with the signed OU 1-07B Record of Decision (ROD) Amendment (DOE-ID 2001) dated August 7, 2001.

The ROD Amendment presents a modification to the original remedy for OU 1-07B, at the INEEL TAN. The modification was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The documents that form the basis for the decisions made in this ROD Amendment are contained in the Administrative Record for OU 1-07B. This decision satisfies the requirements of the FFA/CO entered into among the U.S. Department of Energy (DOE), the U.S. Environmental Protection Agency (EPA), and the Idaho Department of Environmental Quality (IDEQ).

This RD/RA SOW identifies the scope, schedule, and budget necessary for the implementation of this RA in accordance with the requirements and objectives of the ROD Amendment (DOE-ID 2001).

1.1 Background

The original selected RA for OU 1-07B was identified in the ROD as “Alternative 4: 25 Micrograms per Liter Trichloroethene Groundwater Contamination Plume Extraction; Hot Spot Containment and/or Removal with Aboveground Treatment.” However, the 1995 ROD (DOE-ID 1995) provided a way to amend the selected remedy by calling for treatability studies:

“If a technology is found to be more effective than [the selected remedy], the Agencies shall, after appropriate public opportunity to review the basis for changing the selected technology, modify this ROD as appropriate and begin design implementation on the alternate remedy.”

Treatability studies conducted between 1995 and 1999 showed that use of monitored natural attenuation (MNA) and an innovative technology, known as in situ bioremediation (ISB), in combination with the originally selected pump-and-treat technology, could clean up the contaminant plume in less time and at a lower cost than the remedy originally selected in the 1995 ROD (DOE-ID 1995). (Figure 1-2 illustrates the location and components of the TAN trichloroethene [TCE] plume.) Therefore, in accordance with Section 117(c) of CERCLA and Section 300.435(c)(2)(ii) of the NCP, and pursuant to the 1995 ROD, the ROD Amendment (DOE-ID 2001) documents the changes.

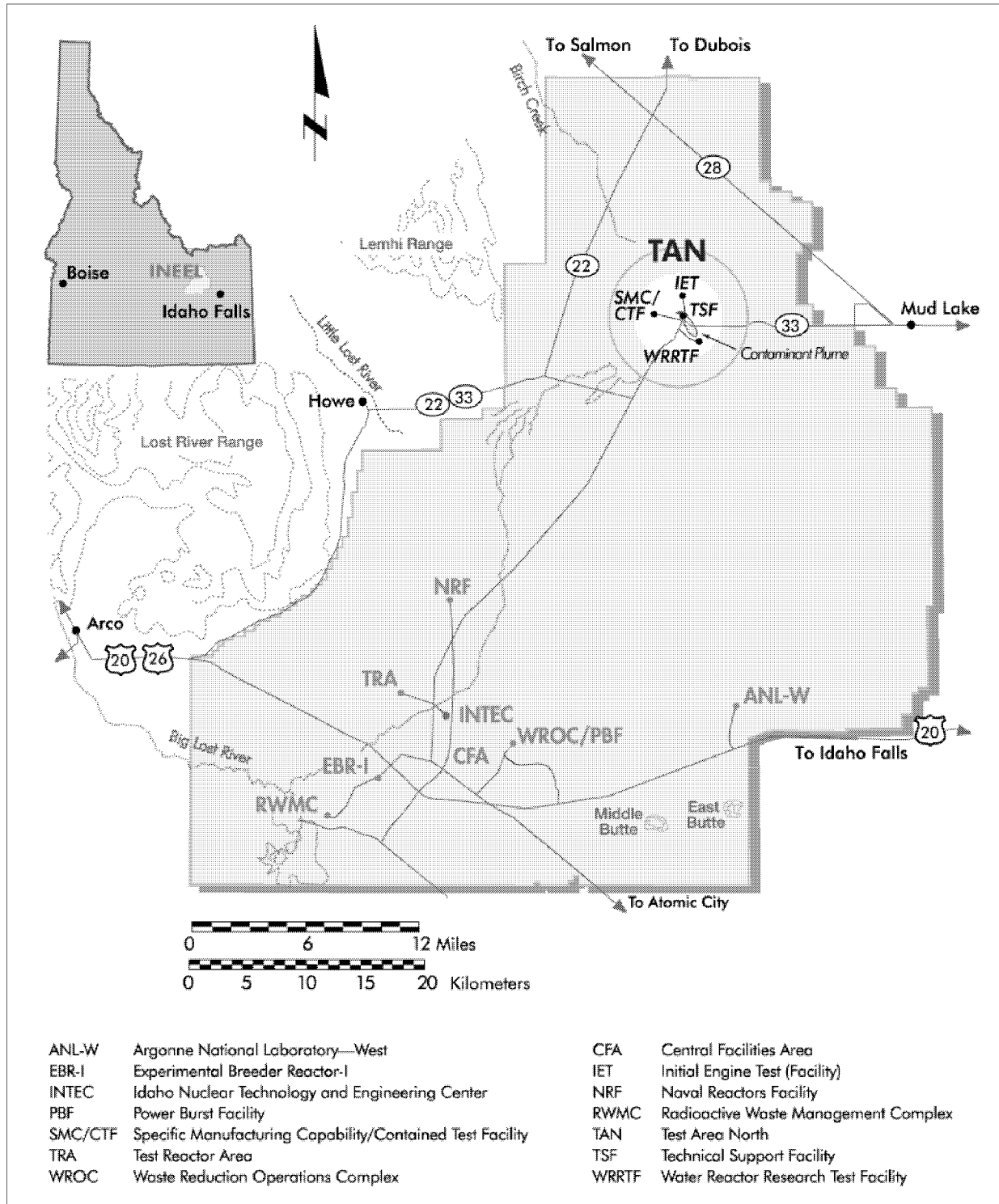


Figure 1-1. Location of the INEEL and TAN.

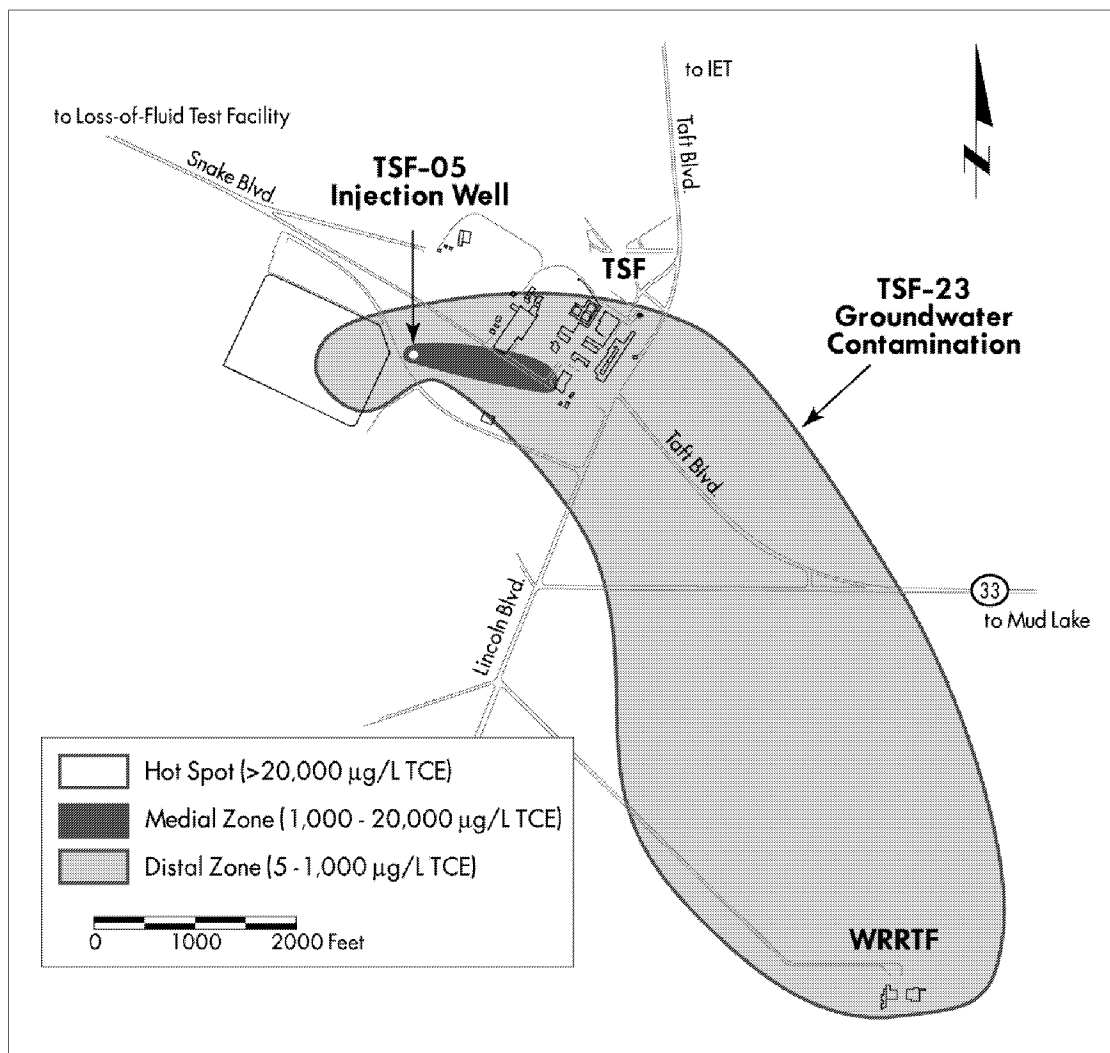


Figure 1-2. TCE plume location showing isopleths in µg/L.

The amended remedy identified in the ROD Amendment is intended to be the final action for remediation of contamination at OU 1-07B. All public participation and documentation procedures specified in NCP Sections 300.435(c)(2)(ii) and 300.825(a)(2) were conducted as required.

Background information for the TSF-05 injection well including location, disposal history, sampling, and previous removal and remedial activities are not discussed in this RD/RA SOW. Background information can be found in the documents listed in Table 1-1.

Table 1-1. Key documents for OU 1-07B completed remediation activities.

Date	Title	Document No.
Aug 95	<i>Record of Decision for the Technical Support Facility Injection Well (TSF-05) and Surrounding Groundwater Contamination (TSF-23) and Miscellaneous No Action Sites Final Remedial Action</i>	DOE/ID-10139
Mar 97	<i>Technology Evaluation Work Plan, Test Area North Final Groundwater Remediation, OU 1-07B</i>	DOE/ID-10562
Aug 97	<i>Remedial Design/Remedial Action Scope of Work, Test Area North Final Groundwater Remediation, Operable Unit 1-07B</i>	DOE/ID-10522
Nov 97	<i>Explanation of Significant Differences from the Record of Decision for the Technical Support Facility Injection Well (TSF-05) and Surrounding Groundwater Contamination (TSF-23) and Miscellaneous No Action Sites, Final Remedial Action</i>	INEEL/EXT-97-00931
Oct 99	<i>Final Record of Decision for Test Area North, Operable Unit 1-10</i>	DOE/ID-10682
Mar 00	<i>Field Demonstration Report, Test Area North Final Groundwater Remediation, Operable Unit 1-07B</i>	DOE/ID-10718
Nov 00	<i>Proposed Plan for Operable Unit 1-07B, Final Remedial Action at the TSF Injection Well (TSF-05) and Surrounding Groundwater Contamination (TSF-23)</i>	DOE/ID-21251
Jan 98	<i>Well Characterization and Evaluation Report Supporting Functional and Operational Requirements for the New Pump and Treat Facility at Test Area North Operable Unit 1-07B</i>	INEL/EXT-97-01356
Feb 98	<i>Site Conceptual Model: 1996 Activities, Data Analysis, and Interpretation – Test Area North Operable Unit 1-07B</i>	INEL/EXT-97-00556
Feb 98	<i>Natural Attenuation Field Evaluation Work Plan, Test Area North, Operable Unit 1-07B</i>	DOE/ID-10606
Sep 98	<i>In Situ Bioremediation Field Evaluation Work Plan, Test Area North, Operable Unit 1-07B</i>	DOE/ID-10639
Jan 99	<i>Numerical Modeling Support of the Natural Attenuation Field Evaluation for Trichloroethene at the Test Area North, Operable Unit 1-07B</i>	INEEL/EXT-97-01284
Apr 99	<i>Laboratory Evaluation of In Situ Chemical Oxidation for Groundwater Remediation, Test Area North, Operable Unit 1-07B, Idaho National Engineering and Environmental Laboratory</i>	ORNL/TM-13711
Oct 99	<i>Phase C Groundwater Monitoring Plan</i>	INEEL/EXT-99-00021
Oct 99	<i>Phase C Remedial Action Work Plan for Test Area North Final Groundwater Remediation, Operable Unit 1-07B</i>	DOE/ID-10679
Nov 99	<i>In Situ Chemical Oxidation Field Evaluation Work Plan for the TSF-05 Hot Spot, Test Area North Final Groundwater Remediation, Operable Unit 1-07B</i>	DOE/ID-10698
Jan 00	<i>Fiscal Year 1999 Groundwater Monitoring Report, Test Area North, Operable Unit 1-07B</i>	INEEL/EXT-99-01255
Mar 00	<i>New Pump and Treat Facility Remedial Design, Test Area North, Operable Unit 1-07B</i>	DOE/ID-10661
Apr 00	<i>Aerobic Biodegradation Laboratory Studies at Test Area North, Operable Unit 1-07B</i>	INEEL/EXT-99-00736
Oct 00	<i>Sampling and Analysis Plan for the Enhanced In Situ Bioremediation Field Evaluation, Test Area North, Operable Unit 1-07B</i>	INEEL/EXT-98-00421
Nov 00	<i>Microbial Studies Report Supporting Implementation of In Situ Bioremediation at Test Area North</i>	INEL/EXT-98-00474

1.2 Summary of Selected Remedy

The amended remedy for OU 1-07B combines ISB for Hot Spot restoration and MNA for distal zone restoration, with the pump-and-treat technology (selected in the 1995 ROD) for the medial zone, providing a comprehensive approach to the restoration of the contaminant plume. The amended remedy also includes groundwater monitoring and institutional controls. The decision to implement the amended remedy signifies completion of Phase B of the original remedy and the initiation of Phase C as defined by the 1995 ROD. However, some actions implemented during Phase B for Hot Spot containment will continue until the ISB component of the amended remedy is fully operational (e.g., ISB pre-design operations).

The OU 1-07B amended remedy will prevent current and future exposure of workers, the public, and the environment to contaminated groundwater at the TSF injection well site. Table 1-2 lists the contaminants of concern (COCs) in the vicinity of the TSF-05 injection well.

This remedial action will permanently reduce the toxicity, mobility, and volume of the contamination at the site. This will be the final action for this site.

In accordance with the original remedy selected in the 1995 ROD, construction of the New Pump-and-Treat Facility (NPTF) in the medial zone was completed in January 2001. The facility started routine operations October 1, 2001. The components of the amended remedy for restoration of the OU 1-07B Hot Spot and dissolved phase contaminant plume (illustrated conceptually in Figure 1-3) are:

- **Hot Spot**—In situ bioremediation takes advantage of bacteria that naturally occur in the aquifer and break down contaminants. An amendment (such as sodium lactate or molasses) is injected into the secondary source area through the TSF injection well or other wells in the immediate vicinity. The amendment increases the number of bacteria, thereby increasing the rate at which the volatile organic compounds break down into harmless compounds. The amendment supply is distributed as needed, and the treatment system operates year-round.
- **Medial Zone**—Pump and treat with extraction of contaminated groundwater, treatment through air strippers, and reinjection of treated groundwater. Air stripping is a process that brings clean air into close contact with contaminated liquid allowing the contaminants to pass from the liquid into the air where they quickly evaporate.
- **Distal Zone**—MNA with annual performance reviews every year for the first 5 years to compare actual natural degradation rates to predicted degradation rates, followed by additional periodic reviews thereafter. Natural attenuation is the physical, chemical, and biological processes that act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in groundwater.
- **Institutional Controls**—Engineering and administrative controls to protect current and future users from health risks associated with groundwater contamination. During the early part of the restoration timeframe, the contaminant plume would continue to increase slowly in size, until the natural attenuation process overtakes it. Modeling suggests that growth of the distal zone of up to 30% might occur, reaching its maximum size in about 2027 (as defined by the 5ppb TCE isopleth). However, since institutional controls would be in place, there would be no change in risk to human health or to ecological receptors. Under this alternative, continued groundwater monitoring and computer modeling would be used to track the plume boundary; the institutional controls area would be modified as required to maintain a conservative buffer zone around the contaminant plume area.
- **Monitoring**—Groundwater monitoring will be conducted throughout the plume, with samples analyzed to determine the progress of the remedy. Water level measurements will

be completed to verify the ability of the NPTF to contain and treat the contaminants in the medial zone.

- **Contingencies**—Contingencies identified under this amended remedy are:
 - For the medial zone, monitoring wells located upgradient of the NPTF will be monitored on a routine basis to ensure that concentrations of radionuclides in the groundwater remain low. If monitoring indicates that the concentration of radionuclides in the NPTF effluent would exceed maximum contaminant levels (MCLs), the Air Stripper Treatment Unit (ASTU; existing but not currently operating) will be used to prevent those radionuclides from traveling downgradient to the NPTF.
 - For the distal zone, if the Agencies determine that MNA will not restore the distal zone of the plume within the restoration timeframe, pump-and-treat units will be designed, constructed, and operated in the distal zone to remediate the plume. The contingency remedy also will be invoked if the required monitoring necessary for MNA is not performed.

Under the amended remedy, the concentrations of the radionuclide COCs in the Hot Spot and medial zone will meet remedial action objectives (RAOs) within the remedial timeframe. Concentrations of the radionuclide COCs in the distal zone are already below RAOs. The groundwater-monitoring program will include monitoring the attenuation of radionuclide COCs in the Hot Spot and the medial zone, as applicable. If monitoring indicates that the concentration of radionuclides in NPTF effluent would exceed MCLs, then contingency would be implemented. The frequency of monitoring at selected locations depends on the potential risk of exceeding MCLs in the NPTF effluent. The Agencies will use the monitoring results to determine appropriate responses.

Table 1-2. COCs in the vicinity of the TSF-05 Injection Well.

Contaminant	Maximum Concentrations ^a	Federal Drinking Water Standard
<i>VOLATILE ORGANIC COMPOUNDS (VOCs)</i>		
TCE	12,000 – 32,000 ppb	5 ppb ^b
Tetrachloroethene (PCE)	110 ppb	5 ppb ^b
cis-1,2-Dichloroethene (DCE)	3,200 – 7,500 ppb	70 ppb ^b
trans-1,2-DCE	1,300 – 3,900 ppb	100 ppb ^b
<i>RADIONUCLIDES</i>		
Tritium	14,900 – 15,300 pCi/L ^c	20,000 pCi/L
Strontium-90	530 – 1,880 pCi/L	8 pCi/L
Cesium-137	1,600 – 2,150 pCi/L	119 pCi/L ^d
Uranium-234	5.2 – 7.7 pCi/L ^e	27 pCi/L ^e

ppb = parts per billion

pCi/L = picocuries per liter.

a. The concentration range is taken from measured groundwater concentrations at the TSF-05 Injection Well (INEEL 2000a).

b. Ppb is a weight-to-weight ratio that is equivalent to micrograms per liter (µg/L) in water.

c. Maximum concentrations of tritium and U-234 are below federal drinking water standards and baseline risk calculations indicate cancer risk of 3×10^{-6} . While this risk is smaller than 1×10^{-4} , both tritium and U-234 are included as COCs as a comprehensive plume management strategy.

d. The MCL for Cs-137 is derived from a limit of 4 millirem per year (mrem/yr) cumulative dose-equivalent to the public, assuming a lifetime intake of 2 liters per day (L/day) of water.

e. The federal drinking water standard for U-234 is for the U-234, -235, and -238 series.

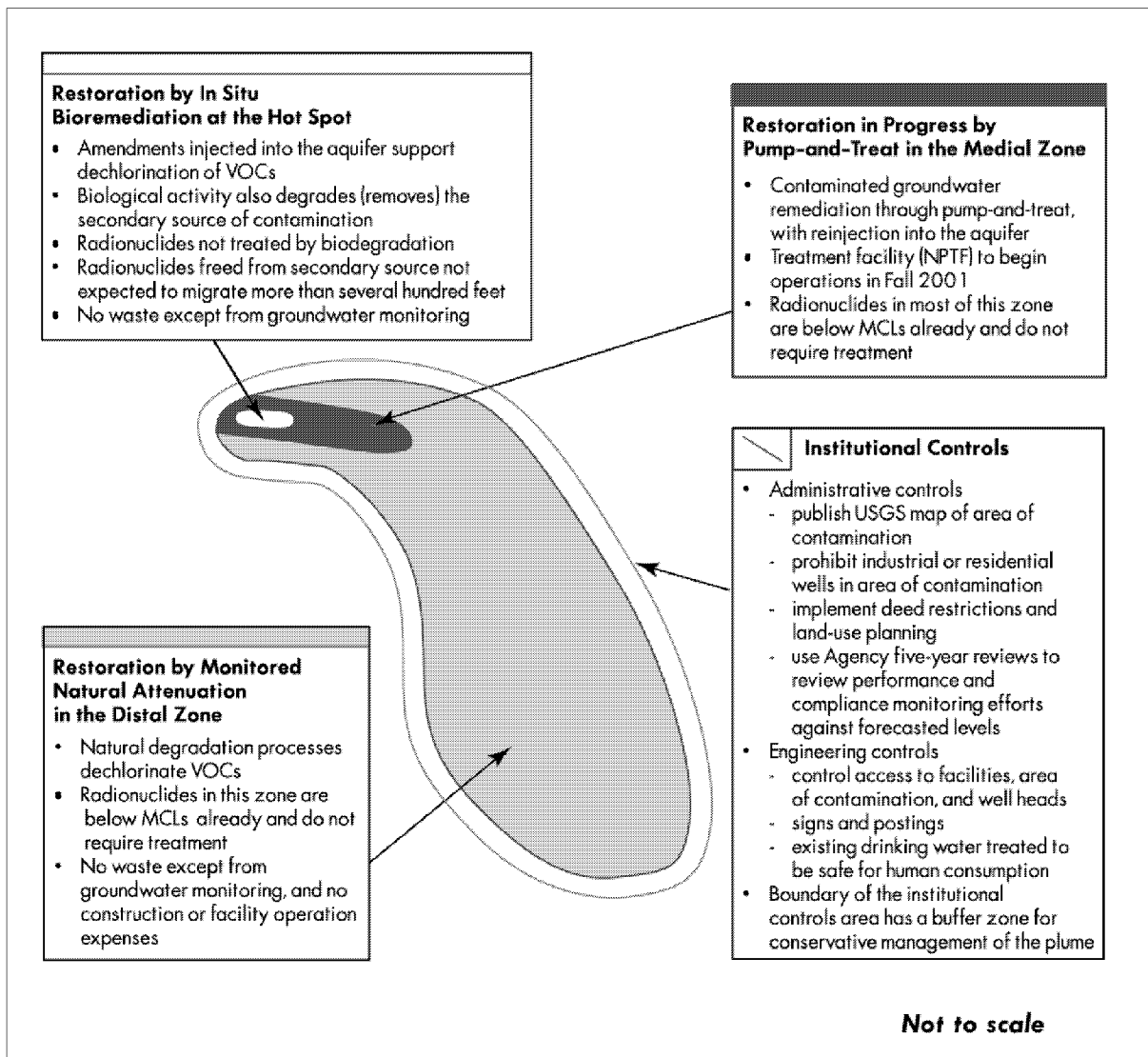


Figure 1-3. Conceptual illustration of the components of the amended remedy (not to scale).

1.3 Remedial Action Objectives

Remedial action objectives from the ROD Amendment are:

- Restore the contaminated aquifer groundwater by the year 2095 (100 years from the signature of the 1995 ROD) by reducing all COC concentrations to below MCLs so that the total cumulative carcinogenic risk-based level for future residential groundwater use is less than 1×10^{-4} and for non-carcinogens, the cumulative hazard index is less than 1.
- For aboveground treatment processes in which treated effluent will be reinjected into the aquifer, reduce the concentrations of VOCs to below MCLs and have a total carcinogenic risk-based level of less than 1×10^{-5} .

- The institutional controls shall be maintained until concentrations of all COCs are below MCLs and until the cumulative carcinogenic risk-based level is less than 1×10^{-4} and for non-carcinogens, until the cumulative hazard index is less than 1. Institutional controls shall include access restrictions and warning signs.

1.4 Performance Criteria for Remediation Goals

Remediation goals were developed to ensure that the final remedy would restore the plume by 2095. The refined RAOs for the final remedy led to specific performance goals for each component of the remedy. Each component of the amended remedy (ISB at the Hot Spot, pump-and-treat in the medial zone, and MNA in the distal zone) is expected to restore the plume prior to or by 2095. The general performance criteria for each remedy component are given below. Specific performance criteria will be developed as part of the RD/RA Work Plan for each component.

1.4.1 In Situ Bioremediation at the Hot Spot

The general performance criterion for ISB consists of a collection of monitoring data that demonstrate complete dechlorination of VOC's to prevent, to the maximum extent practicable, migration of VOCs above MCLs beyond the hot spot and to restore the plume by 2095.

1.4.2 Pump-and-Treat in the Medial Zone

The ROD Amendment (DOE-ID 2001) did not modify or amend the medial zone pump-and-treat component. The general performance criterion for the NPTF consists of completing drawdown measurements to ensure that the contaminated groundwater plume is contained and treated and to show that groundwater monitoring wells within the medial zone have COC concentrations less than the MCL and 1×10^{-5} cumulative risk. NPTF effluent will be monitored for hazardous substances (chemical constituents and radionuclides) on a routine basis to ensure reinjected water is below MCLs. Additionally, as part of the MNA monitoring program, wells just down gradient of the NPTF will be monitored to measure NPTF output.

1.4.3 Monitored Natural Attenuation in the Distal Zone

The performance criteria for MNA will consist of evaluating monitoring data to determine (1) that natural attenuation processes trend toward attainment of RAOs to reduce contaminant concentrations in the distal zone of the plume within the restoration timeframe, and (2) that plume expansion does not exceeds 30% of the 5 µg/L isopleth. Predicted breakthrough curves at a selected set of wells will be compared to actual groundwater monitoring data. These evaluations will be conducted once every year for the first 5 years (Fiscal Years [FY] 2001 through 2005) and at least once every five years thereafter. If four consecutive evaluations show that the RAOs will not be met within the restoration timeframe, the contingency remedy (pump and treat) for the distal zone will be implemented or if the Agencies concur, a more cost-effective remedy will be identified and implemented as the contingency remedy. If, as a result of a 5-year review, data analysis indicates that the RAO will not be met within the restoration time frame, additional annual reviews will be conducted until four consecutive evaluations produce the same result. The contingency remedy also will be invoked if the required monitoring necessary for MNA is not performed.

1.5 Participating Organizations

The DOE-ID, EPA Region 10, and IDEQ are co-signatories to the FFA/CO and have regulatory authority for the cleanup at the INEEL. The DOE is responsible for the overall management and funding

of the Environmental Restoration Program at the INEEL in compliance with all governing federal and state statutes and regulations.

1.6 Data Management and Quality Assurance

Data collected during the activities associated with the OU 1-07B RD/RA will be managed in accordance with the data management plan (DMP) for the INEEL's Environmental Restoration Department. Such activities may include groundwater monitoring, hydrogeological testing, and groundwater treatment system operations. The DMP will be updated as necessary to ensure all categories of data generated during project activities are addressed.

Data quality objectives (DQOs) will be established to ensure that quality-assured data is obtained and managed to support making defensible decisions concerning RA activities in accordance with the quality assurance project plan (QAPjP). Sample collection, sample analysis, and data validation will be performed in accordance with the QAPjP. All RD and RA activities will be planned in accordance with the requirements of the quality program plan for Environmental Restoration.

2. FINAL REMEDIAL ACTION IMPLEMENTATION APPROACH

The initial objective of this RD/RA SOW is to bring the entire RA into long-term operations after all components have been declared operational and functional (e.g., finalization of the RA report). After accomplishing this goal, the objective is to then set up a sound long-term operation strategy and performance and compliance monitoring evaluation process.

The final RA is implemented by completing RD/RA documentation, constructing new facilities, operating facilities, monitoring and evaluating remedy performance and compliance, and decommissioning and dismantling (D&D) obsolete facilities. Figure 2-1 is a flow chart that represents the decision-making process leading up to long-term operation and maintenance.

Components of the RA are not at the same stage of completion during implementation of this RD/RA SOW. Additionally, the requirements to implement and reach an operational status for each component are different; however, similar phases must be followed for each remedial component leading ultimately to long-term operations.

There are four primary phases that this RD/RA SOW will address:

1. Remedial Action Strategy Development
 - a. Performance and Compliance Monitoring Strategy—A performance and compliance monitoring strategy, as well as an optimization strategy, will be developed for each remedial component using data gathered through field sampling events. The purpose of these strategies will be to develop a predictive numerical model that will be used to predict, measure, and assess the ability of the remedial component to meet performance and compliance goals and objectives.
 - b. RD/RA Work Plan—RD/RA documentation will be developed, modified, or revised to implement project and Agency decisions and strategies for each remedial component. RD/RA documentation may be modified as needed throughout initial operations to reflect changing conditions, optimization tactics, and modifications necessitated by technology refinements.
2. Initial Operations
 - a. RA Infrastructure Installation—Each remedial component will have some form of RA infrastructure to support long-term implementation. Part of the initial operations phase will be to install this infrastructure.
 - b. Start-up Testing—This covers those actions and activities necessary to meet the CERCLA requirement for an Agency concurrence that the RD has been constructed or installed as specified (e.g., an Agency pre-final inspection and report).
 - c. Shakedown Testing—This activity covers the operation of the facility and/or collection of performance and compliance data for the purpose of making a determination of whether the remedy components meet the operational requirement established in the RD/RA Work Plan.

3. Remedy Performance Evaluation

- a. Remedial Component Annual Performance Report—An annual report for each component will be prepared during the period from 2002 to 2007. This report will compile performance and compliance monitoring data. Additionally, as part of the activity leading up to the preparation of this report, yearly model simulation will be performed with the field data to verify that the RA is trending in accordance with initial model projection.
- b. RA Report—A final inspection and RA report will be prepared at the conclusion of the shakedown period. This report will summarize the performance of the RA during shakedown and be the vehicle by which the Agencies and the project make a determination of whether the remedial component can be declared operational and functional.

4. Long-term Operations

- a. Periodic Remedy Performance Reviews—Using the operational basis developed and refined through initial operation, the RA will go into long-term operation and maintenance. During this period, the Agencies will monitor remedy performance through periodic remedy performance reviews. The schedule for these reviews will be identified in the RA report. The reviews will be supported by a periodic remedy performance report, which will be a compilation of annual remedy performance reports.
- b. Contingent Remedies—For the medial and distal zone remedial components, a contingent remedy has been identified. If at any time throughout the process those components are found to have fatal flaws (determined not to be able to meet RAOs), the contingent remedy will be implemented.

2.1 Performance and Compliance Monitoring Strategy

Performance and compliance monitoring strategies will be developed for each remedial component under this RA. These strategies will be used to gauge the ability of each remedial component to meet performance and compliance goals and objectives and contribute to the overall effectiveness and success of the RA. Perhaps the most important aspect of this activity is the development of the evaluation process and decision logic to be used in determining the performance of each remedial component. If the evaluation process shows that the RAO will not be met, then the project and the Agencies will reconsider the implementation of the remedial component and determine, in accordance with the decision logic, whether a different operational strategy would make the remedial component successful at achieving the RAOs.

A numerical model will be developed for each component using field data from current and previous years. ISB will utilize the RT3D model and MNA and NPTF will utilize the Modflow model. These models will be tested with several simulations and an initial performance baseline will be established. Using the results of these simulations, each component's RD/RA operating and sampling documentation will be developed or revised to reflect new operating and monitoring requirements resulting from the simulations. A yearly update will be implemented for each remedial component using the previous year's data to execute additional model simulations. An annual report will document the results of the simulations comparing them to baseline simulations and, if necessary, RD/RA documentation will be modified to change operating and monitoring strategies.

Figure 2-1. Decisions leading to long-term operations and maintenance.



2.1.1 In Situ Bioremediation

The performance monitoring strategy for ISB will be an outgrowth of the pre-design operations (PDO) monitoring activity currently underway. The strategy will include monitoring wells that define the active biological reaction cell, the area surrounding the reaction cell, both the upper and lower portions of the aquifer, as well as a down gradient compliance monitoring location to evaluate trends toward and attainment of the source area RAO. The frequency of monitoring will continue as currently planned in the PDO Sampling and Analysis Plan (INEEL 2001c). Existing monitoring data will be used to calibrate a model, RT3D, to provide the capability to compare future monitoring data against predicted performance. The model may also be used to evaluate the need for and location of new monitoring or amendment injection wells.

2.1.2 New Pump and Treat Facility

The NPTF performance monitoring strategy is relatively straightforward. The NPTF design requires that the system capture 150% of the width of the medial zone and that the air strippers treat VOC concentrations to below MCLs and less than 1×10^{-5} cumulative carcinogenic risk. The performance monitoring strategy for plume capture will be to collect water level data in monitoring wells surrounding the NPTF. To avoid complications of seasonal water level variation and barometric pressure effects, the measurements will be taken for a period of time surrounding the start of pumping. Draw down tests will be conducted whenever the pumps are turned on after a maintenance activity or, in the absence of the need for maintenance work, once every six months. The compliance monitoring strategy will continue the influent/effluent sampling locations and frequency set up for start-up operations (SO) testing. A model will be prepared to allow simulation of NPTF capture and the effects of reinjection. This model will be derived from the larger scale Modflow model developed to support the MNA performance monitoring strategy. The model will be used to determine the best location for monitoring trends toward and attainment of the medial zone RAO.

2.1.3 Monitored Natural Attenuation

The MNA performance monitoring strategy will rely on development of a simulation model to predict breakthrough curves at various locations in the distal zone as well as simulation of plume growth. The model will be run in a well-known code, Modflow/MT3D, to ensure that the long-term performance basis for MNA will be available to new project or agency personnel as the composition of the remediation team changes. A key component of the MNA performance monitoring strategy is the conversion of the existing TETRAD simulation domain to an equivalent Modflow/MT3D domain. The conversion was completed in FY 2001 and verification testing in FY 2002 will ensure that the new model matches TETRAD simulation runs. The performance monitoring strategy will present both degrading and non-degrading simulations for comparison with future monitoring data. The strategy will also present the process by which future monitoring data are compared to simulation predictions and the decision logic that will be used to evaluate trends toward and attainment of the distal zone RAO.

2.2 Remedial Design and Remedial Action Documentation

An RD/RA Work Plan will be or has been developed for each remedial component. Each plan, in concert with appropriate supporting documents, will provide the basis for long-term operation of each remedial component. Section 3 of this document will provide a detailed description of the RD/RA documents planned for each remedial component. The RD/RA will identify and establish requirements regarding design, technical and functional requirements, applicable or relevant and appropriate requirements (ARARs), and identify necessary secondary documents for operating, monitoring, and reporting. An annual performance and compliance monitoring and simulation activity is planned to

develop remedy performance trends. As a result of these activities, updates or modifications to RD/RA documentation may be necessary to refine the operating and monitoring activities for each component. Documents that are key to implement the RD/RA for each remedy component are described below

2.2.1 In Situ Bioremediation

In Situ Bioremediation is currently operating in accordance with the ISB PDO work plan (INEEL 2001a). It is anticipated that by October 2002 an ISB RD/RA work plan will be developed and approved by the Agencies to replace the PDO Work Plan. The ISB RD/RA work plan will be based upon both documentation and operating strategies developed during the ISB Field Evaluation and subsequent PDO period. It is anticipated that the Agencies will agree that the existing ISB infrastructure, constructed for the ISB Treatability Study Field evaluation, is adequate, with minor modification, for long-term operations. Likewise, procedures and operating manuals developed for the field evaluation will, with minor modifications, be used for long-term operations.

Key Documents for ISB:

- **RD/RA Work Plan**—The RD/RA Work Plan will identify and establish requirements regarding design, technical and functional requirements, ARAR compliance, and identify necessary secondary documents for operating, monitoring, and reporting.
- **Technical and Functional Requirements**—Identifies the operating and performance requirements for the ISB infrastructure design.
- **Remedial Design**—Includes drawings and specifications for construction and/or modification of the ISB infrastructure.
- **Operation and Maintenance Plan**—Sets the basis for operating and maintenance requirements and identifies the required procedures and manuals needed for long-term operations.
- **Monitoring Plan**—Sets the basis for performance and compliance monitoring by identifying data needs, DQOs, sampling methods, analytical techniques, and monitoring frequency.

2.2.2 New Pump and Treat Facility

The NPTF is currently operating in accordance with the OU 1-07B Phase C RA Work Plan (DOE-ID 1999b) and supporting documents. This RD/RA SOW does not change the operational basis for the NPTF nor does it produce any new operational basis documentation for the NPTF. This RD/RA SOW does, however, provide the basis for modifying the documents that detail NPTF performance and compliance monitoring requirements. Under this SOW, provisions are made for developing a performance and compliance monitoring strategy for the NPTF and subsequent modification to performance monitoring/compliance monitoring (PM/CM) implementation document and field sampling protocol.

Key documents for NPTF:

- **Phase C Operations and Maintenance Plan**—The requirements for operating and sampling may cause changes in procedures and implementation plans currently identified in this document.

- Phase C Groundwater Monitoring Plan (INEEL 1999b)—Sampling and analytical requirements may be modified due to the PM strategy.

2.2.3 Monitored Natural Attenuation

Monitored Natural Attenuation is currently being performed in accordance with the OU 1-07B Phase C Ground Water Monitoring Plan (INEEL 1999b), which will continue to govern monitoring activities through FY-03. Following the development of the MNA Performance Monitoring strategy identified above in section 2.1, the MNA RA Work Plan (MWP) will be developed as the basis for long-term monitoring and maintenance of the MNA remedial component. This document will govern all MNA activities starting in FY-04.

Key Documents for MNA:

- MNA RA Work Plan—The MWP will identify and establish requirements regarding design, technical and functional requirements, ARARs compliance, and identify necessary secondary documents for operating, monitoring, and reporting.
- MNA Groundwater Monitoring Plan—This plan sets the basis for performance and compliance monitoring by identifying DQOs, sampling methods, analytical techniques, and monitoring frequency.
- MNA Operations and Maintenance Plan—This plan will detail the requirements and identify the procedures for operating and maintaining the MNA monitoring well system and equipment.

2.3 Remedial Action Field Work

Final remedial action field work consists of three significant areas: facility and infrastructure construction, facility operations, and groundwater monitoring.

2.3.1 In Situ Bioremediation

The Agencies have agreed that the ISB field evaluation infrastructure will become the long-term RA facility with only minor modifications. Additionally, the performance monitoring strategy may identify the need for additional monitoring wells in order to implement the strategy. Long-term sampling will continue on a routine basis, with the frequency decreasing throughout the remediation period based upon Agency periodic reviews.

- ISB Construction—The ISB work plan development and performance simulation activities planned for FY-02 will identify the need for facility modifications. It is currently anticipated that these modifications will be required to provide the capability to inject amendment at a location(s) other than directly into TSF-05. Also, the performance strategy development may result in the need for additional monitoring well or wells in the vicinity of the Hot Spot.
- Facility Operations—ISB operational activities will consist of periodic amendment injections and periodic facility maintenance. These activities will be defined in the ISB O&M (operation and maintenance) Plan, a component of the ISB RD/RA WP.

- Monitoring—Groundwater monitoring encompasses the majority of the field work associated with ISB. The activities will be defined in the ISB Groundwater Monitoring Plan, a component of the ISB RD/RA WP.

2.3.2 New Pump and Treat Facility

The NPTF was constructed prior to the issuance of the 2001 ROD Amendment. The facility was designed to operate 24 hours per day, seven days per week, with minimal supervision. Routine performance and compliance monitoring will be required and annual maintenance will be performed.

- NPTF Construction—This facility was completed in 2001.
- NPTF Operations—Routine operations began October 1, 2001.
- Monitoring—Routine performance and compliance monitoring began October 1, 2001.

2.3.3 Monitored Natural Attenuation

Monitored Natural Attenuation field work is primarily related to groundwater monitoring or well maintenance type activities. The performance monitoring strategy may result in the need for additional monitoring wells in order to implement the strategy. Long-term sampling will continue on a routine basis, with decreasing frequency as the remediation period progresses.

- MNA Construction—Install new monitoring wells.
- MNA Operations—Maintenance of monitoring well system
- Monitoring—Annual performance monitoring.

2.4 Remedial Component Operational and Functional Determination

Each remedial component (ISB, NPTF, and MNA) will go through a series of steps leading to a RA report in which the project and the Agencies can make a determination that the remedial component is operational and functional. This process primarily focuses on the ability of the remedial component to meet performance and compliance requirements and objectives. The performance and compliance monitoring strategy development mentioned in section 2.1 is key to the success of this process. It is anticipated that the Agencies will agree that after a set period of time, hereafter referred to as initial operations, that a determination of future performance of the remedial component may be measured as a result of trends observed during initial operations. The following sections describe this process for each remedial component.

2.4.1 In Situ Bioremediation

ISB operations and field sampling and analysis will continue in accordance with the pre-design work plan initially and ultimately in accordance with the ISB RD/RA work plan. During FY-02 the performance and compliance monitoring strategy will be developed. Several simulations using the model will be performed to determine the optimum injection and monitoring strategies. This information will be used to develop an initial monitoring strategy for ISB and will be documented in the ISB RD/RA work plan.

This new strategy will be implemented starting in FY-03. The data that is obtained as a result of annual routine sampling from FY-01 through FY-04 will be compiled on an annual basis in a document titled the ISB Annual Performance Report. During FY-05, a final inspection and RA report will be compiled based in part on three years of sampling data and performance simulations. The object of this report is to determine whether ISB has met the initial model projections and is trending toward successful achievement of the project's RAOs. If the data suggest that ISB is meeting RAOs and the trend indicates continued success, long-term operations will continue. If evaluation of monitoring data indicates predicted performance trends are not being achieved, the project team and the Agencies will evaluate the ISB implementation strategy and determine whether different operational strategies may be more successful than the current method. If a determination is made that an alternate implementation strategy may be successful, then the alternate strategy would be implemented. If a determination were made that there is a fatal flaw with the remedial component, then the project would proceed toward implementing a remedy through a ROD Amendment.

2.4.2 New Pump and Treat Facility

New Pump and Treat Facility operations and field sampling and analysis will continue in accordance with the Phase C work plan (DOE-ID 199b). During FY-02 the performance and compliance monitoring strategy will be developed. Several model simulations will be performed to determine the optimum operating and monitoring strategies. Any changes to the operating and monitoring and strategies will be documented in an update to the NPTF O&M plan.

This new strategy will be implemented starting in FY-03. The data that is obtained, as a result of annual routine sampling from FY-01 through FY-03, will be compiled on an annual basis in the NPTF Annual Performance Report. If evaluation of monitoring data indicates predicted performance trends are not being achieved, the project team and the Agencies will evaluate the NPTF implementation strategy and determine if different operational strategies may be more successful than the current method. If a determination is made that an alternate implementation strategy may be successful, then this strategy would be implemented. If a determination were made that there is a fatal flaw with the remedial component, then the project would proceed toward implementing the contingent remedy.

2.4.3 Monitored Natural Attenuation

Monitored Natural Attenuation field sampling and analysis will continue in accordance with the Phase C Groundwater Monitoring Plan (INEEL 1999b) through FY-02. During FY-02 the performance and compliance monitoring strategy will be developed, assisted by the development of the Modflow Model. Several simulations of the model would be performed to determine the optimum operating and monitoring strategies. This information will be used to develop an initial monitoring strategy for MNA and will be documented in the MNA work plan.

This new strategy will be implemented starting in FY-03. The data that is obtained, as a result of annual routine sampling from FY-01 through FY-05, will be compiled on an annual basis in a document titled the MNA Annual Performance Report. During FY-06 a final inspection and remedial action report will be compiled, based in part on five years of sampling data and performance simulations. The object of this report is to determine whether or not MNA has met the initial model projections and is trending toward successful achievement of the project's RAOs. If evaluation of monitoring data indicates predicted performance trends are not being achieved, the project team and the Agencies will evaluate the MNA implementation strategy and determine if different operational strategies may be more successful than the current method. If a determination is made that an alternate implementation strategy may be successful then this strategy would be implemented. If a determination were made that there is a fatal

flaw with the remedial component, then the project would proceed toward implementing the contingent remedy of pump and treat.

2.5 Long-term Operations

Long-term operations will be fully effective with the completion of the RA report for MNA, declaring MNA operational and functional. Following this determination, all three remedial components will be in long-term operations and subject to periodic reviews by the Agencies. Upon completion of the RA report, a schedule for periodic reviews will be developed to support Agency monitoring of remedy performance. Currently, the plan will be to compile the data on an annual basis for each remedial component and perform model simulation to develop performance and compliance matching curves and compare these to baseline model simulations. These three annual remedial component reports will be summarized in an annual remedy performance summary report. Periodically, the Agencies and the project team will meet to review performance of the remedial components. If evaluation of monitoring data indicates predicted performance trends are not being achieved, then the project team and the Agencies will review and evaluate the operating strategy for the remedy.

The remedy performance summary report will include the following topics:

- Remedial component regulatory performance and compliance with RAOs
- Remedial component's budgetary performance
- Institutional controls.

3. REMEDIAL DESIGN/REMEDIAL ACTION DOCUMENTATION

Since this RD/RA SOW is associated with a ROD Amendment for a remedial action already in progress, there is RD/RA documentation already in existence that governs ongoing actions and operations. The purpose of this section is to identify existing documents that will continue to govern actions or operations and the new CERCLA operational basis documentation required to implement the RD/RA as required by the ROD Amendment.

This section is broken down by remedial component and identifies for each, existing RD/RA documentation that will continue to govern the work process, the length of time that the documentation will remain in force, and new documentation that is necessitated by requirements imposed by the ROD Amendment. A document hierarchy is provided as Figure 3-1, which breaks down the Remedial Action documentation into separate components, common documents, and D&D. This section also describes the purpose and content of each document and tells whether the document is considered a secondary or primary document.

RA documents are the operational basis for implementing the RA in accordance with the ROD Amendment, and ensure the RA will be compliant with the ROD, regulatory requirements and RAOs. Each remedial component of this RA is or will be governed by an RA work plan or equivalent document. RA work plan documents are considered CERCLA primary documents. In addition to the work plan, supporting documents such as O&M plans and groundwater monitoring plans are necessary for providing guidance on specific field work regulatory requirements.

Common documents are required to convey regulatory requirements for very specific project tasks that are common to all remedial action tasks.

D&D documents provide the basis for removing from service several facilities that are being phased out. These documents will detail how the project will manage the cleanup and waste disposition for these facilities.

3.1 ISB Documents

Under the ROD Amendment, in situ bioremediation is a new remedial component of the OU 1-07B remediation project and as such will have an RD/RA work plan developed for it. Currently, ISB is operating under the basis provided by the ISB Pre-Design Operations Work Plan (INEEL 2001a). This will be the case until the ISB RD/RA Work Plan and supporting documents have been completed and the long-term operations facility is completed.

3.1.1 Existing ISB Documentation

The In Situ Bioremediation Predesign Operations Work Plan, Test Area North, OU 1-07B, (INEEL 2001b) and Sampling and Analysis Plan for Enhanced In Situ Bioremediation Pre-design Operations, Test Area North, (INEEL 2001c) currently govern ISB operations.

3.1.2 New ISB Documentation

The following documents make up the CERCLA RD/RA documentation basis for ISB:

1. **ISB Technical and Functional Requirements (T&FR)**—Using the results of the ISB PDO operations, design parameters for the ISB will be determined. These parameters, along with other significant operational requirements, will be compiled into a T&FR document. The information included in the T&FR will be used to proceed with the design of the ISB Facility.
2. **ISB 90% Design**—A 90% design will be prepared for incorporation into the ISB RD/RA work plan. The 90% design will include construction drawings, process drawings, and equipment specifications. This design will be based on the existing design prepared for the ISB Field Evaluation Facility.
3. **ISB RD/RA Work Plan**—The RD/RA work plan will be submitted as a primary document, with a draft and final submittal. This document is subject to the usual 45-day Agency review. The RD/RA Work Plan will include the following, as necessary:
 - Design criteria, plans, and specifications; system drawings; and equipment descriptions
 - Description of how the RA will meet ARARs
 - RD/RA cost estimate
 - RD/RA schedule
 - ISB groundwater sampling and analysis plan
 - Health and safety plan revision (common document)
 - ISB O&M plan
 - Waste management plan/waste minimization plan revision (common document)
 - Identification of additional RA documents and inspections
 - Identification of protocol and coordination of field oversight and inspections
 - ISB performance and compliance monitoring requirements
 - ISB institutional control requirements
 - Evaluation criteria for determining effectiveness.

Consensus will be reached on elements of the RD/RA work plan during conference calls and design review meetings prior to submittal of the draft RD/RA work plan. The final document will incorporate and respond to Agency comments on the draft RD/RA work plan.

4. **ISB Pre-final Inspection Report**—The project managers or their designees will conduct the pre-final inspection. The DOE-ID will prepare the Pre-final Inspection Report and respond

to comments received on the report. The schedule for the Pre-final Inspection will be set in the RD/RA work plan. The Pre-final Inspection Report will include the following:

- Inspection checklist
 - Discussion of findings
 - Outstanding RA requirements
 - Corrective action plans
 - O&M plan update, if necessary
 - Final inspection date.
5. **RT3D Model Project Manual**—Upon completion of the initial RT3D model, a manual will be prepared that provides a description and steps by which the initial model was prepared and the method by which annual simulations will be performed. The intent of this manual is to provide continuity among modelers over the ISB operational life.
 6. **Annual ISB Performance Report**—The annual report will summarize the annual data, report on new performance simulations and provide trending information against previous model simulations. The result of this report will be summarized, along with the other remedial components (simulation reports) in the annual remedy performance summary report. (Expected implementation of the new monitoring strategy is October 2002.)
 7. **ISB Final Inspection - RA Report**—After approximately three years of operations, utilizing the initial ISB performance and compliance monitoring strategy, the Agencies and the project will conduct a final inspection and data evaluation based upon the previous year's data, and RT3D modeling predications, to determine whether ISB is performing as expected. If there is a positive outcome, the RA report will declare that ISB is operational and functional and recommend proceeding to long-term operations.

3.2 New Pump and Treat Facility Documents

The operational basis for the NPTF is in accordance with the 1995 OU 1-07B ROD and subsequent Phase C RD/RA Work Plan (DOE-ID 1999b) and supporting documents. The NPTF remedial component does not have its operational basis changed by the ROD Amendment (DOE-ID 2001). However, as a result of the ROD Amendment, the Phase C RD/RA Work Plan and other relevant supporting documents will be modified so as to only support NPTF operations. This will include document title modifications and removing reference to other remedial components where relevant.

3.2.1 Existing NPTF Documentation

The OU 1-07B Phase C Work Plan is the operational basis for NPTF. Supporting documents are:

- Phase C O&M plan (DOE-ID 2001b)
- Phase C Groundwater Monitoring Plan (INEEL 1999b)
- NPTF remedial design (DOE-ID 2000b).

3.2.2 New NPTF Documentation

The following documents will be created in support of NPTF long-term operations:

- **NPTF Modflow Model Project Manual**—Upon completion of the initial Modflow Model, a manual will be prepared that provides a description and steps by which the initial model was prepared and the method by which annual simulations will be performed. The intent of this manual is to provide continuity among modelers over the operational life of the NPTF.
- **Annual NPTF Performance Report**—The annual report will summarize the annual data, report on new performance simulations, and provide trending information against previous model simulations. The result of this report will be summarized, along with the other remedial components, in the annual remedy performance summary report.
- **NPTF Final Inspection - RA Report**—A RA Report will be prepared by August 2002 declaring the NPTF operational and functional.

3.3 Monitored Natural Attenuation Documents

Under the ROD Amendment, MNA is a new remedial component of the OU 1-07B remediation project and as such, will have an RD/RA work plan developed for it. The OU 1-07B Phase C groundwater monitoring plan is currently providing the groundwater sampling requirements for MNA and this will be the case until the MNA work plan and supporting documents have been completed.

3.3.1 Existing MNA Documentation

The OU 1-07B Phase C Groundwater Monitoring Plan (INEEL 1999b) and associated supporting documents currently govern MNA operations. The new MNA work plan is expected to be in place by FY-03.

3.3.2 New MNA Documentation

The following documents will make up the CERCLA RD/RA documentation basis for MNA:

- **MNA Performance and Compliance Monitoring Strategy Report**—This report will document initial baseline performance and compliance comparisons and simulations. The results of this report/strategy will be the MNA operational basis documentation for creation of the MNA RD/RA work plan.
- **MNA Modflow Model Project Manual**—Upon completion of the initial MNA Modflow Model, a manual will be prepared that provides a description and steps by which the initial model was prepared and the method by which annual simulations will be performed. The intent of this manual is to provide continuity among modelers over the MNA operational life.
- **MNA Work Plan**—This document will be the RD/RA work plan equivalent for MNA and will be submitted as a primary document, with a draft and final submittal. This document is subject to the usual 45-day Agency review. This document will include the following as necessary:
 - Description of how the RA will meet ARARs

- RA cost estimate
- RA schedule
- MNA groundwater sampling and analysis plan, including a QAPjP
- Health and safety plan revision (common document)
- MNA operations and maintenance plan
- Waste management plan/waste minimization plan revision (common document)
- Identification of additional RA documents and inspections
- Identification of protocol and coordination of field oversight and inspections
- MNA performance and compliance monitoring requirements
- MNA institutional control requirements
- Evaluation criteria for determining effectiveness.

Consensus will be reached on elements of the MNA work plan during conference calls and design review meetings prior to submittal of the draft MNA work plan. The final document will incorporate and respond to Agency comments on the draft RD/RA work plan.

1. Annual MNA Performance Simulation Report—The annual simulation report will summarize the annual data, report on new performance simulations, and provide trending information against previous model simulations. The result of this report will be summarized along with the other remedial components in the annual remedy performance summary report.
2. MNA Final Inspection - RA Report—After five years (FY-06) of initial monitoring utilizing the initial MNA performance and compliance monitoring strategy, the Agencies and the project will conduct a data evaluation based upon the previous year's data and Modflow modeling predications to determine whether MNA is performing as expected. If there is a positive outcome, the RA report will declare that MNA is operational and functional and recommend proceeding to long-term operations.

3.4 Common Documents

There are a number of project documents that are common to all three remedial components and to D&D. These documents provide regulatory and operational direction for specific areas of concern. These documents will typically be updated to include the scope and requirements of a remedial component as the RD/RA work plan for that component is developed or if significant changes occur to the scope of a component that require basis document modification.

3.4.1 Existing Common Documentation

A number of key common documents were included with the Phase C RD/RA work plan development that will be modified to cover all three remedial components. These documents are:

- **OU 1-07B Health and Safety Plan INEEL/EXT (INEEL 1999c)**—This document was prepared as a requirement under the tri-party agreement governing this CERCLA action. This health and safety plan (HASP) covers health and safety requirements for each of the three remedial components.
- **OU 1-07B Waste Management Plan INEEL/EXT (INEEL 1999d)**—This waste management plan identifies the waste types and quantities the project is expected to generate during the implementation of this RA. This plan addresses the various waste streams' sources and classification and gives guidance for their disposition. It also addresses the actions necessary to characterize and classify new waste streams not previously identified.
- **Interim Decontamination Plan INEEL/EXT (INEEL 1999e)**—The interim decontamination plan identifies the methods and techniques to facilitate the decontamination of tanks and containers, drill strings, and downhole logging equipment used for drilling wells and for groundwater sampling activities at OU 1-07B.

3.4.2 New Common Documentation

Several new common documents will be developed as part of the implementation of the OU 1-07B RA in accordance with the ROD Amendment. These are:

- **Periodic Remedy Performance Report**—The remedy performance report will report on remedial component regulatory performance and compliance with RAOs and report on overall remedy performance within scope, schedule, and budget.
- **Institutional Control Status Report of TAN, Waste Area Group (WAG) 1**—This report presents the status of institutional control measures currently being taken for WAG 1 sites at TAN. This status report contains a record of recent inspections, site histories, brief profiles of contaminants, and summaries of future actions.

3.5 D&D Documents

As part of this remedial action, several D&D guidance documents will be prepared. While not required under this CERCLA action, these documents are good practice to document methods, procedures, equipment and resource needs, and waste disposition requirements for the removal of decommissioned project infrastructure.

3.5.1 New D&D Documentation

D&D documentation will be prepared for the following facilities:

- **Groundwater Treatment Facility (GWTF)**—The GWTF will be phased out as a remedial component over the next several years. Some existing equipment and tanks may have beneficial reuse on the OU 1-07B project or on other site projects. A D&D plan will be prepared to decontaminate and dismantlement the GWTF and decontaminate or otherwise disposition the facility.
- **Air Stripper Treatment Unit**—The ASTU will remain in cold standby as a contingent remedy for the NPTF. The ASTU will eventually be phased out as a remedial component. At that time, a D&D plan will be prepared to remove the ASTU and decontaminate or otherwise disposition the facility.

4. RD/RA SCHEDULE AND DELIVERABLES

The RD/RA schedule has been derived through development of the project requirements as defined by the 1995 ROD (DOE-ID 1995) and further refined by ROD Amendment (DOE-ID 2001). The basis for the schedule is the logical development of project tasks and activities, which support RD/RA commitments, milestones, and Agency decision points.

In accordance with the FFA/CO tri-party agreement, there are certain documents that are deliverables to the Agencies and subject to review and approval. These documents are designated as primary or secondary documents in Section XII of the FFA/CO with required, established Agency review and comment resolution durations.

The RD/RA schedule has been created with clear enforceable milestone dates established for the delivery of primary documents. The project schedule has been developed to expedite performance to meet or exceed enforceable milestone commitments ahead of schedule. Further, the goal of the project is to achieve, at a minimum, the expedited RD/RA SOW schedule; however, a plan to expedite RD/RA implementation will be pursued to achieve quicker time-to-field and ultimately, faster remediation.

4.1 RD/RA SOW Schedule

The OU 1-07B RD/RA schedule is presented in Figure 4-1. This schedule identifies a logical progression of tasks and activities aimed at achieving the RAOs through the development of each remedial component. The diagram presented in Figure 2-1 provides the logic which will determine when each remedial component becomes operational and functional. This logic is further enumerated and detailed with the RD/RA Schedule presented here as Figure 4-1. This schedule covers RD/RA document preparation, facility construction, facility operations, field monitoring activities, remedy compliance, and performance evaluation and reporting.

4.2 RD/RA Deliverables

The documents to be submitted to the Agencies as deliverables are presented in Table 4-1 with their corresponding submittal dates in accordance with Section XII of the FFA/CO. Milestone deliverable dates were developed as a result of the ROD Amendment commitments.

This RD/RA SOW contains a schedule for RD deliverables for implementation of the RA. Additional deliverables, if necessary, may be identified in subsequent documents.

DOE will provide the documents to the EPA and IDEQ for review. Documents will have expedited and non-expedited review and revision schedules. The review periods vary depending on the document. In general, all expedited draft primary documents have a 30-day review and in some instances the draft final submittal has been eliminated. Draft primary documents (non-expedited) have the standard 45-day review period. Secondary documents will have the standard 30-day review period.

Activity Description	Orig Dur	Early Start	Early Finish
ROD Amendment RD/RA SOW RD/RA Scope of Work Prepared	65	12JUL01	10OCT01
Final ROD Amendm't Submit'd For Agency Signature	0	08AUG01*	
Agency Signature Process	32	08AUG01	20SEP01
Agency Signature	0		20SEP01
Draft RD/RA SOW Submitted To Agencies For Review	0		10OCT01
Agency Review and Comment Resolution	25	11OCT01	14NOV01
OU 1-07B RD/RA SOW Final	0		14NOV01
In-situ Bio Remediation Perf/Compliance Strategy ISB Performance Simulation and EDF	165	01OCT01*	17MAY02
Develop ISB PM Strategy and Report	56	01MAR02*	17MAY02
Submit ISB PM Strategy Report For Agency Review	0		17MAY02
Agency Review ISB PM Report	20	20MAY02	14JUN02
ISB PM Report Final	0		14JUN02
RD/RA Workplan/Design Develop Technical and Functional Requirements	33	15JAN02*	28FEB02
Prepare ISB Remedial Action Workplan	142	15JAN02*	31JUL02
ISB T&FR's Submitted For Agencies Review	0		28FEB02
Agency Review and Comment Resolution ISB T&FR's	22	01MAR02	01APR02

RD/RA Scope of Work Prepared

Final ROD Amendm't Submit'd For Agency Signature

Agency Signature Process

Agency Signature

Draft RD/RA SOW Submitted To Agencies For Review

Agency Review and Comment Resolution

OU 1-07B RD/RA SOW Final

ISB Performance Simulation and EDF

Develop ISB PM Strategy and Report

Submit ISB PM Strategy Report For Agency Review

Agency Review ISB PM Report

ISB PM Report Final

Develop Technical and Functional Requirements

Prepare ISB Remedial Action Workplan

ISB T&FR's Submitted For Agencies Review

Agency Review and Comment Resolution ISB T&FR's

Start Date
02OCT09
Finish Date
12JUL01
Data Date
19NOV01 14:18

Early Bar
Progress Bar
Critical Activity

01JUL01
02OCT09
12JUL01
19NOV01 14:18

RD/RA

OU 1-07B TAN Final Groundwater Remediation

RD/RA Scope of Work Schedule

Start Date
02OCT09
Finish Date
12JUL01
Data Date
19NOV01 14:18

Early Bar
Progress Bar
Critical Activity

01JUL01
02OCT09
12JUL01
19NOV01 14:18

RD/RA

OU 1-07B TAN Final Groundwater Remediation

RD/RA Scope of Work Schedule

Start Date
02OCT09
Finish Date
12JUL01
Data Date
19NOV01 14:18

Early Bar
Progress Bar
Critical Activity

01JUL01
02OCT09
12JUL01
19NOV01 14:18

RD/RA

OU 1-07B TAN Final Groundwater Remediation

RD/RA Scope of Work Schedule

Start Date
02OCT09
Finish Date
12JUL01
Data Date
19NOV01 14:18

Early Bar
Progress Bar
Critical Activity

01JUL01
02OCT09
12JUL01
19NOV01 14:18

RD/RA

OU 1-07B TAN Final Groundwater Remediation

RD/RA Scope of Work Schedule

Start Date
02OCT09
Finish Date
12JUL01
Data Date
19NOV01 14:18

Early Bar
Progress Bar
Critical Activity

01JUL01
02OCT09
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19NOV01 14:18

RD/RA

OU 1-07B TAN Final Groundwater Remediation

RD/RA Scope of Work Schedule

Start Date
02OCT09
Finish Date
12JUL01
Data Date
19NOV01 14:18

Early Bar
Progress Bar
Critical Activity

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19NOV01 14:18

RD/RA

OU 1-07B TAN Final Groundwater Remediation

RD/RA Scope of Work Schedule

Start Date
02OCT09
Finish Date
12JUL01
Data Date
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Early Bar
Progress Bar
Critical Activity

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RD/RA

OU 1-07B TAN Final Groundwater Remediation

RD/RA Scope of Work Schedule

Start Date
02OCT09
Finish Date
12JUL01
Data Date
19NOV01 14:18

Early Bar
Progress Bar
Critical Activity

01JUL01
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RD/RA

OU 1-07B TAN Final Groundwater Remediation

RD/RA Scope of Work Schedule

Start Date
02OCT09
Finish Date
12JUL01
Data Date
19NOV01 14:18

Early Bar
Progress Bar
Critical Activity

01JUL01
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RD/RA

OU 1-07B TAN Final Groundwater Remediation

RD/RA Scope of Work Schedule

Start Date
02OCT09
Finish Date
12JUL01
Data Date
19NOV01 14:18

Early Bar
Progress Bar
Critical Activity

01JUL01
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RD/RA

OU 1-07B TAN Final Groundwater Remediation

RD/RA Scope of Work Schedule

Start Date
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12JUL01
Data Date
19NOV01 14:18

Early Bar
Progress Bar
Critical Activity

01JUL01
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RD/RA

OU 1-07B TAN Final Groundwater Remediation

RD/RA Scope of Work Schedule

Start Date
02OCT09
Finish Date
12JUL01
Data Date
19NOV01 14:18

Early Bar
Progress Bar
Critical Activity

01JUL01
02OCT09
12JUL01
19NOV01 14:18

RD/RA

OU 1-07B TAN Final Groundwater Remediation

RD/RA

Activity Description	Orig Dur	Early Start	Early Finish
Prepare ISB Remedial Design	86	02APR02	30JUL02
Submit ISB Draft RD/RA WP for Agency Review (P)	0		31JUL02
ISB RD/RA WP Agency Review/Comm't Res	64	01AUG02	29OCT02
Submit ISB Draft RD/RA WP for Agency Review (E)	0		30SEP02*
ISB RD/RA WP Final	0		29OCT02
NPTF Performance			
NPTF Performance Simulation and EDF	143	01NOV01*	20MAY02
NPTF PM Strategy Development	81	02JAN02*	24APR02
NPTF PM Report Submitted For Agency Review	0		24APR02
NPTF PM Report Agency Rev and Comm't Resol'n	43	25APR02	24JUN02
Revise NPTF RD/RA O&M Plan	152	01OCT02*	30APR03
Submit Rev'd NPTF O&M Plan For Agency Review (P)	0		30APR03
NPTF O&M Plan Agency Review and Comm't Res	86	01MAY03	28AUG03
Submit Rev'd NPTF O&M Plan For Agency Review (E)	0		30JUN03*
NPTF O&M Plan Ready For Field Implement	0		28AUG03
MNA Performance			
MNA Performance Simulation and EDF	132	01OCT01*	02APR02
Develop MNA PM Strategy and Report	55	03APR02	18JUN02
Submit MNA PM Report To Agencies For Review	0		18JUN02

Start Date: 01JUL01

Finish Date: 02OCT09

Data Date: 12JUL01

Run Date: 19NOV01 14:18

Early Bar

Progress Bar

Critical Activity

RDR1

OU 1-07B TAN Final Groundwater Remediation

RD/RA Scope of Work Schedule

Sheet 2 of 5

Date

Revision

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Activity Description	Orig Dur	Early Start	Early Finish
MNA PM Report Agency Review/Comment Resolution	74	19JUN02	30SEP02
Develop MNA RD/RA WP (MNA WP)	76	01OCT02	14JAN03
Submit MNA WP For Agency Review (Planned)	0		14JAN03
MNA WP Agency Review and Comment Resolution	77	15JAN03	01MAY03
Submit MNA WP For Agency Review (Enforced)	0		14MAR03*
MNA WP Ready For Implementation	0		01MAY03
ISB Field Work			
ISB Pre-Design Operations (FY-02)	261	01OCT01*	30SEP02
ISB Final Remedial Construction	261	01OCT02*	30SEP03
ISB RD/RA WP Routine Operations (FY-03)	261	01OCT02	30SEP03
Agency Pre-Final Inspection ISB Facility	5	01OCT03	07OCT03
ISB Pre-Final Insp Rpt Preparation	63	08OCT03	02JAN04
ISB Routine Operations (FY-04)	257	08OCT03	30SEP04
ISB Pre-Final Insp Rpt to Agency For Review (P)	0		02JAN04
Agency Review ISB Pre-Final Insp. Report	31	05JAN04	16FEB04
Comment Resolution ISB Pre-Final Insp Report	34	17FEB04	02APR04
ISB Pre-Final Insp Rpt to Agencies (E)	0		02APR04
ISB Pre-Final Insp Rpt Final	0		02APR04

Start Date 01JUL01

Finish Date 02OCT09

Data Date 12JUL01

Run Date 19NOV01 14:18

Early Bar

Progress Bar

Critical Activity

OU 1-07B TAN Final Groundwater Remediation

RD/RA Scope of Work Schedule

Sheet 3 of 5

RDR1

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Activity Description	Orig Dur	Early Start	Early Finish
Compile ISB FY-04 Field Data	107	01OCT04	28FEB05
ISB Routine Operations (FY-05)	260	01OCT04	29SEP05
Generate ISB FY-04 Annual PM/CM Report	88	01MAR05	30JUN05
Prep ISB Final Inspect'n & Remedial Action Rpt	65	01JUL05	29SEP05
Agency Decision ISB Operational & Functional	0		28SEP05
ISB Long-Term Operations	543	30SEP05	30OCT07
NPTF Field Work			
NPTF Routine Operations (FY-02)	261	01OCT01*	30SEP02
NPTF Remedial Action Report	65	03JUN02*	30AUG02
NPTF Rem Action Rpt to Agencies (P)	0		30AUG02
Agencies Review NPTF Rem Action Rpt	30	02SEP02	11OCT02
NPTF Routine Operations (FY-03)	261	01OCT02	30SEP03
Comm Res Agencies Review NPTF RA Rpt	30	14OCT02	22NOV02
NPTF RA Report Final	0		22NOV02
NPTF Rem Action Rpt to Agencies (E)	0		29NOV02
NPTF Routine Operations (FY-04)	262	01OCT03	30SEP04
NPTF Long-Term Operations	782	01OCT04	01OCT07
MNA Field Work			
MNA Routine Groundwater Monitoring (FY-02)	261	01OCT01*	30SEP02

Start Date: 01JUL01

Finish Date: 02OCT09

Data Date: 12JUL01

Run Date: 19NOV01 14:18

Legend:

- Early Bar
- Progress Bar
- Critical Activity

Sheet 4 of 5

OU 1-07B TAN Final Groundwater Remediation

RD/RA Scope of Work Schedule

RDR1

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Revision

Date

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Activity Description	Orig Dur	Early Start	Early Finish
MNA VP Groundwater Monitoring (FY-03)	261	01OCT02	30SEP03
MNA Statistical Groundwater Monitoring (FY-04)	262	01OCT03	30SEP04
MNA Routine Groundwater Monitoring (FY-05)	261	01OCT04	30SEP05
Compile MNA FY-05 PM Sample Data	108	03OCT05	01MAR06
Prepare MNA FY-05 PM Simulation Report	88	02MAR06	03JUL06
MNA Field Evaluation Report and Agency Review	64	04JUL06	29SEP06
Agency Decision MNA is Operations and Functional	0		29SEP06
OU 1-07B Remedial Action Operational & Functional	0		29SEP06
MNA Long-Term Monitoring	785	29SEP06	01OCT09

[illegible]

Table 4-1. Agency deliverable documents.

Deliverable	Planned Submittal Date	Enforceable Submittal Date	Review Duration	Document Type
Hot Spot Remediation				
ISB Technical and Functional Requirements	03/02	N/A	30	Secondary
ISB RD/RA Work Plan	07/02	09/02	45	Primary
ISB Pre-final Inspection Report	01/04	03/04	45	Primary
ISB Remedial Action Report ¹	TBD	TBD	45	Primary
ISB Performance Report	05/02	N/A	INFO	External Release
O&M Plan, Revision ²	TBD	TBD	45	Primary
ISB Annual Performance Report	July/yearly	N/A	INFO	External Release
O&M Report ³	TBD	TBD	45	Primary
Medial Zone Remediation⁴				
NPTF Annual Performance Report	July/yearly	N/A	INFO	External Release
NPTF Remedial Action Report	08/02	11/02	45	Primary
Phase C O&M Plan Revision	04/03	06/03	45	Primary
O&M Report ⁵	TBD	TBD	45	Primary
Distal Zone Remediation				
MNA RD/RA Work Plan	01/03	03/03	45	Primary
MNA Annual Performance Report	July/yearly	N/A	INFO	External Release
MNA Field Evaluation Report ⁶	TBD	TBD	45	Primary
O&M Plan Revision ⁷	TBD	TBD	45	Primary
O&M Report ⁸	TBD	TBD	45	Primary
Remedy Performance Evaluation				
Remedy Performance Summary Report ⁹	Annual/ Periodic	N/A	Info	External Release

(1) Document deliverable date determined in the ISB Pre-final Inspection Report.

(2) Deliverable date set in the ISB Remedial Action Report.

(3) Deliverable date set in the ISB O&M Plan revision.

(4) Phase C RA Work Plan (DOE/ID-10679) Oct. 1999 governs medial zone operations.

(5) Deliverable date set in the Phase C O&M revision.

(6) Deliverable date set in the MNA RD/RA Work Plan.

(7) Deliverable date set in MNA Field Evaluation Report.

(8) Deliverable date set in Field Evaluation Report.

(9) Annual report first 5 years, periodic thereafter.

5. COST ESTIMATE

Outyear funding availability for RD/RA projects is subject to congressional approval of DOE budgets. The DOE has identified adequate funding in existing budget plans for this project for the period from FY-02 through FY-04. Table 5-1 contains the project cost estimate from the OU 1-07B ROD expressed in 1999 dollars with a discount rate of 7%. It should be noted that the OU 1-07B ROD cost estimate was prepared using present worth calculations. This estimate may be used for comparison throughout the project. The costs are expected to be within -30 to +50% of the actual remediation costs.

The Federal Acquisition Regulations subpart 36.203(c) states that a detailed cost estimate cannot be disclosed to the public until the contract is awarded. This RD/RA SOW is a public document, so no detailed cost estimate is included. A detailed construction cost estimate will be developed during the RD/RA work plan preparation and will be used to verify the accuracy of any selected subcontractors' RA cost estimates.

Table 5-1. Cost estimate summary for the amended remedy.

Planned Activity	Costs (in FY-99 dollars)	Net Present Value ^a
IN SITU BIOREMEDIATION OF THE HOT SPOT		
ISB Design	\$ 10,415	
ISB Construction	95,285	
ISB O&M (FY-04 to FY-18) (annual cost: \$204,891)	2,868,474	
ISB D&D (FY-31)	258,772	
<i>Total for ISB at the Hot Spot</i>	3,232,940	\$ 1,483,576
MONITORED NATURAL ATTENUATION IN THE DISTAL ZONE		
MNA O&M (FY-04 to FY-30) (annual cost: \$77,620)	2,095,740	
<i>Total for MNA in the Distal Zone</i>	2,095,740	709,804
COMMON ELEMENTS		
NPTF Construction	1,913,000	
Remedial Action Work Plan Revision	121,791	
NPTF O&M (FY-04 to FY-16) (annual cost: \$148,389)	1,929,057	
ASTU Standby Operations (FY-04 to FY-16)	65,000	
Project Management	5,745,400	
Institutional Controls	184,000	
Facility Operations/Waste Management (FY-00 to FY-03)	3,980,700	
Facility Operations/Waste Management (FY-04 to FY-30)	2,957,429	
GWTF D&D (FY-03)	1,291,087	
NPTF D&D (FY-18)	442,269	
ASTU D&D (FY-18)	1,104,820	
Groundwater Monitoring	4,490,140	
Well Abandonment (FY-31)	1,160,400	
<i>Total for Common Elements</i>	25,307,490	14,381,518
COSTS INCURRED THROUGH FY-99		
Treatability Studies	8,002,000	
Project Management (FY-95 to FY-99)	3,335,000	
GWTF Transition to OU 1-07B	2,466,000	
GWTF Operations (FY-95 to FY-99)	2,272,000	
Groundwater Monitoring (FY-95 to FY-99)	996,000	
NPTF Design	469,000	
NPTF Well Construction	1,300,000	
<i>Total for Costs Incurred through FY-99</i>	18,840,000	18,840,000
TOTAL COSTS		
TOTAL PROJECT COST	49,553,779	35,414,898
Contingency at 50% ^b	15,356,890	8,287,449
TOTAL PROJECT COST AND CONTINGENCY	\$64,910,669	\$43,702,347
a. Net present value using a 7% discount rate and assuming a 15-year operating period for both ISB at the Hot Spot and pump-and-treat in the medial zone, and a 30-year operating period for MNA in the distal zone.		
b. Contingency is not applied to the costs incurred through FY-99.		

6. RD/RA ASSUMPTIONS

- Assumes that the existing ISB injection facility will be, with minor modifications, the long-term injection facility
- Assumes that the existing ISB facility design, with modification will become the ISB Remedial Design 90% submittal.
- Assumes that existing procedures for ISB implementation from the PDO and FEWP periods may be used during the final RA with minor modifications.
- Assumes that a 30% and 60% design submittal for ISB are not necessary
- Assumes that a remedial design is not necessary for MNA.

7. REGULATORY REQUIREMENTS

Under CERCLA Section 121, response actions conducted entirely on-site are exempt from obtaining federal, state, or local permits. These actions are, however, required to comply with the substantive aspects of the ARARs specified for the site. The selected remedy will comply with the ARARs specified in the OU 1-07B ROD Amendment (DOE-ID 2001). The RD/RA work plan for each phase will demonstrate how ARARs pertinent to the work performed will be met in accordance with Section 7.7(b) of the FFA/CO and Section 2.12 of the FFA/CO Action Plan. The design documents will address the substantive aspects of the identified ARARs and describe how the RA will comply with the requirements. Appendix A contains the ARARs for this action and the proposed implementation strategy.

In accordance with Section 7.7(a) of the FFA/CO, federal and state permits, which would be required if the RA were not conducted under CERCLA, must be noted. These permits are listed in Table 7-1.

Table 7-1. List of permits.

Activity	Agency	Permit
Operate Treatment Facility	Idaho Department of Environmental Quality (IDEQ), Air Quality	Air quality for fugitive and toxic emissions
Operate Treatment Facility	EPA Region 10	National Emission Standard for Hazardous Air Pollutants approval for radionuclide emissions
Operate RCRA Storage Facility	IDEQ, Hazardous Waste	Hazardous Waste Management Act Permit
Operate RCRA Treatment Facility	IDEQ, Hazardous Waste	Hazardous Waste Management Act Permit
Discharge of Treated Effluent to Injection Well	IDEQ, IDWR, Water Quality	Underground Injection Control Program Permit
Closure RCRA Storage Facility	IDEQ, Hazardous Waste	RCRA Closure Permit
Closure RCRA Treatment Unit	IDEQ, Hazardous Waste	RCRA Closure Permit

8. DOCUMENT APPROVAL PROCEDURES AND REQUIREMENTS

The procedures and requirements for obtaining approval of the RD/RA documents will follow those outlined in the FFA/CO. The various deliverables identified in Section 4.0 will be reviewed for the following elements:

- Compliance with ARARs
- Use of currently accepted environmental control measures and technology
- The adequacy of the design plans
- Consistency with the OU 1-07B ROD Amendment
- Environmental impacts
- Implementability
- Cost estimate completeness and accuracy
- Utilization of currently accepted practices and techniques.

The DOE shall have the authority to approve and accept the design and must obtain the concurrence of the other Agencies.

9. REFERENCES

- 36 CFR 800.4, 2000, "Identification of Historic Properties," *Code of Federal Regulations*, U.S. Government Printing Office, July.
- 40 CFR 61, 2000, National Emission Standards for Hazardous Air Pollutants, *Code of Federal Regulations*, U.S. Government Printing Office, April.
- 40 CFR 262, 2000, "Standards Applicable to Generators of Hazardous Waste," *Code of Federal Regulations*, U.S. Government Printing Office, July.
- 40 CFR 264, 2000, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," *Code of Federal Regulations*, U.S. Government Printing Office, July.
- 40 CFR 300, 2000, "National Oil and Hazardous Substances Pollution Contingency Plan," *Code of Federal Regulations*, U.S. Government Printing Office, July.
- DOE Order 5400.5, 1993, "Radiation Protection of the Public and the Environment," U.S. Department of Energy, January.
- Executive Order 12580, 1987, "Protection of Environment, Superfund Implementation," U.S. Government Printing Office, January.
- IDAPA 37.03.03, 2000, "Rules and Minimum Standards for the Construction and Use of Injection Wells in the State of Idaho," *Idaho Administrative Code*, Department of Water Resources, July.
- IDAPA 58.01.01, 2000, "Rules for the Control of Air Pollution in Idaho," *Idaho Administrative Code*, Idaho Department of Administration, July.
- IDAPA 58.01.05, 2000, "Rules and Standards for Hazardous Waste," *Idaho Administrative Code*, Idaho Department of Administration, July.
- IDAPA 58.01.08, 2000, "Idaho Rules for Public Drinking Water Systems," *Idaho Administrative Code*, Idaho Department of Administration, July.
- 42 USC 82 §§ 6901 et seq., "Resource Conservation and Recovery Act," *U.S. Code*, U.S. Government Printing Office.
- 42 USC 103 §§ 9601 et seq., "Comprehensive Environmental Response, Compensation, and Liability Act," *U.S. Code*.
- DOE-ID, 1995, *Record of Decision for the Technical Support Facility Injection Well (TSF-05) and Surrounding Groundwater Contamination (TSF-23) and Miscellaneous No Action Sites Final Remedial Action*, DOE/ID-10139, August.
- DOE-ID, 1997a, *Remedial Design/Remedial Action Scope of Work, Test Area North Final Groundwater Remediation, Operable Unit 1-07B*, DOE/ID-10522, August.
- DOE-ID, 1997b, *Technology Evaluation Work Plan, Test Area North Final Groundwater Remediation, OU 1-07B*, DOE/ID-10562, March.

- DOE-ID, 1998a, *Natural Attenuation Field Evaluation Work Plan, Test Area North, Operable Unit 1-07B*, DOE/ID-10606, February.
- DOE-ID, 1998b, *In Situ Bioremediation Field Evaluation Work Plan, Test Area North, Operable Unit 1-07B*, DOE/ID-10639, September.
- DOE-ID, 1999a, *Final Record of Decision for Test Area North, Operable Unit 1-10*, DOE/ID-10682, October.
- DOE-ID, 1999b, *Phase C Remedial Action Work Plan for Test Area North Final Groundwater Remediation, Operable Unit 1-07B*, DOE/ID-10679, October.
- DOE-ID, 1999c, *In Situ Chemical Oxidation Field Evaluation Work Plan for the TSF-05 Hot Spot, Test Area North Final Groundwater Remediation, Operable Unit 1-07B*, DOE/ID-10698, November.
- DOE-ID, 2000a, *Field Demonstration Report, Test Area North Final Groundwater Remediation, Operable Unit 1-07B*, DOE/ID-10718, March.
- DOE-ID, 2000b, *New Pump and Treat Facility Remedial Design, Test Area North, Operable Unit 1-07B*, DOE/ID-10661, March.
- DOE-ID, 2000c, *Proposed Plan for Operable Unit 1-07B, Final Remedial Action at the TSF Injection Well (TSF-05) and Surrounding Groundwater Contamination (TSF-23)* (DOE/ID-21251), November.
- DOE-ID, 2001a, *Record of Decision Amendment for the Technical Support Facility Injection Well (TSF-05) and Surrounding Groundwater Contamination (TSF-023) and Miscellaneous No Action Sites, Final Remedial Action*, DOE/ID-10139, August.
- DOE-ID, 2001b, *Phase C Operations and Maintenance Plan for Test Area North Final Groundwater Remediation Operable Unit 1-07B*, DOE/ID-10684, Revision 1, April.
- EG&G, 1994, *Remedial Investigation (RI) Final Report with Addenda for the Test Area North (TAN) Groundwater (GW) Operable Unit (OU) 1-07B at the INEL, Volumes 1 and 2*, EGG-ER-10643, Vol. 1 and 2, January.
- EPA, 1999a, *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites*, EPA 540-F-99-009, OSWER Directive 9200.4-17P, April.
- EPA, 1999b, *Region 10 Final Policy on the Use of Institutional Controls at Federal Facilities*, EPA Region 10, Office of Environmental Cleanup, May.
- EPA, 1999c, *Guidance on Preparing Superfund Decision Documents*, EPA 540-R-98-031, OSWER Directive 9200.1-23P, July.
- INEL, 1992, *Record of Decision (ROD) for Technical Support Facility (TSF) Injection Well and Surrounding Groundwater Contamination*, INEL-5202, September.
- INEL, 1998, *Well Characterization and Evaluation Report Supporting Functional and Operational Requirements for the New Pump and Treat Facility at Test Area North Operable Unit 1-07B*, INEL/EXT-97-01356, January.

INEL, 2000, *Microbial Studies Report Supporting Implementation of In Situ Bioremediation at Test Area North*, INEL/EXT-98-00474, November.

INEEL, 1997, *Explanation of Significant Differences from the Record of Decision for the Technical Support Facility Injection Well (TSF-05) and Surrounding Groundwater Contamination (TSF-23) and Miscellaneous No Action Sites, Final Remedial Action*, INEEL/EXT-97-00931, November.

INEEL, 1998, *Site Conceptual Model: 1996 Activities, Data Analysis, and Interpretation – Test Area North Operable Unit 1-07B*, INEL/EXT-97-00556, February.

INEEL, 1999a, *Numerical Modeling Support of the Natural Attenuation Field Evaluation for Trichloroethene at the Test Area North, Operable Unit 1-07B*, INEEL/EXT-97-01284, January.

INEEL, 1999b, *Phase C Groundwater Monitoring Plan*, INEEL/EXT-99-00021, October.

INEEL, 1999c, *Test Area North Operable Unit 1-07B Final Groundwater Remedial Action Health and Safety Plan*, INEEL/EXT-99-00020, Revision 0.

INEEL, 1999d, *Waste Management Plan for Test Area North Final Groundwater Remediation Operable Unit 1-07B*, INEEL/EXT-99-00267, Revision 2, October.

INEEL, 1999e, *Interim Decontamination Plan for Operable Unit 1-07B*, INEEL/EXT-97-01287, Revision 2, October.

INEEL, 2000a, *Fiscal Year 1999 Groundwater Monitoring Report, Test Area North, Operable Unit 1-07B*, INEEL/EXT-99-01255, January.

INEEL, 2000b, *Aerobic Biodegradation Laboratory Studies at Test Area North, Operable Unit 1-07B*, INEL/EXT-99-00736, April.

INEEL, 2000c, *Engineering Design File (EDF) – Metals Analysis of Selected OU 1-07B Groundwater Monitoring Wells*, INEEL/EXT-2000-00821 (EDF-ER-200), Rev. 0, October.

INEEL, 2000d, *Sampling and Analysis Plan for the Enhanced In Situ Bioremediation Field Evaluation, Test Area North, Operable Unit 1-07B*, Rev. 2, INEEL/EXT-98-00421, October.

INEEL, 2001a, *Engineering Design File (EDF) – WAG 1, OU 1-07B, Record of Decision (ROD) Amendment Cost Estimate Support Data Recapitulation*, EDF-ER-201, Rev. 2, August.

INEEL, 2001b, *In Situ Bioremediation Predesign Operations Work Plan, Test Area North Operable Unit 1-07B*, INEEL/EXT-2000-00647, April.

INEEL, 2001c, *Sampling and Analysis Plan for Enhanced In Situ Bioremediation Predesign Operations, Test Area North, Operable Unit 1-07B*, INEEL/EXT-2000-00925, Revision 1, May.

ORNL, 1999, *Laboratory Evaluation of In Situ Chemical Oxidation for Groundwater Remediation, Test Area North, Operable Unit 1-07B, Idaho National Engineering and Environmental Laboratory*, ORNL/TM-13711, April.

Appendix A

Compliance with Regulatory Requirements

Table A-1. Compliance with regulatory requirements.

Category	Type	Regulatory Requirements	Implementation Strategy
Air Discharges (Carcinogens and Noncarcinogens)	Chemical	<p>Idaho Toxic Air Pollutants</p> <p>For all sources constructed or modified since May 1, 1994, the net screening emissions levels (EL) and net acceptable ambient concentrations (AAC) for non-carcinogens which are not specifically controlled elsewhere in Idaho Administrative Procedures Act (IDAPA) regulation will comply with the table identified in IDAPA 58.01.01.585.</p> <p>For all sources constructed or modified since May 1, 1994, the net screening ELs and AAC for carcinogens which are not specifically controlled elsewhere in these rules, are as provided in the table identified in IDAPA 58.01.01.586.</p> <p>IDAPA 58.01.01.585 and IDAPA 58.01.01.586.</p>	<p>This requirement is only applicable for the medial zone remedy. NPTF air emissions were modeled using an EPA approved air modeling program. Air emissions limits were established using the model results. The results of this modeling are documented in the NPTF Remedial Design and Remedial Action Work Plan.</p>
	Chemical	<p>NESHAPS</p> <p>Emissions of radionuclides to the ambient air from DOE facilities shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/year.</p> <p>40 CFR 61.92</p> <p>Establishes standards and requirements for operations of the DOE and DOE contractors with respect to protection of members of the public and the environment against undue risk from radiation. Includes narrative and numerical standards (air and water) for management of radioactive liquid effluent and radiation protection of the public. In addition, the Order provides radiological protection requirements and guidelines for cleanup of residual radioactive material and management of the resulting wastes and residues, and release of property.</p> <p>DOE Order 5400.5 (To Be Considered)</p>	
Air Discharges (Radionuclide)	Chemical	<p>DOE Order 5400.5 (To Be Considered)</p>	<p>This requirement is only applicable for the medial zone remedy. Emissions from the NPTF will be estimated using calculations as allowed under the provisions of 40 CFR 61.93. The calculated emissions will be given to INEEL Environmental Affairs personnel for inclusion in the annual INEEL National Emissions Standards for Hazardous Air Pollutants (NESHAPS) Report.</p>

Table A-1. (continued).

Category	Type	Regulatory Requirements	Implementation Strategy
Air Discharges (Monitoring)	Action	Continuously monitor radionuclide emissions per the requirements in 40 CFR 61.93 if the discharge of radionuclides without pollution control equipment could cause an effective dose equivalent in excess of .1 mrem/yr. If continuous emissions modeling is not required, periodically perform confirmatory measurements to verify the low emissions. 40 CFR 61.93	<p>This requirement is only applicable to the medial zone remedy. Annual radionuclide emissions from the NPTF will be conservatively calculated using the following parameters:</p> <ul style="list-style-type: none"> • Overall quantity of waste processed • Average radionuclide concentration (i.e., tritium) • Air stream flow rate. <p>The emissions will then be included in a site wide model to determine the effective dose equivalent for the nearest public receptor. If predicted uncontrolled emissions are less than .1 mrem/yr, then uncontrolled emissions will be periodically estimated and documented as outlined in the Phase C O&M Plan.</p>
Fugitive Dust	Action	<p>All reasonable precautions will be taken to prevent the generation of fugitive dust. IDAPA 58.01.01.651 identifies examples of reasonable precautions for preventing fugitive dust.</p> <p>IDAPA 58.01.01.650 and .651</p>	<p>During construction activities, all reasonable precautions will be taken to minimize fugitive dust through application of engineering controls. Potential options include:</p> <ul style="list-style-type: none"> • Use of water sprays and dust suppressants • Halting construction activities during periods of high winds.
Hazardous Waste Determination	Action	<p>A person who generates a solid waste must determine if the waste is a hazardous waste by using the following method:</p> <ol style="list-style-type: none"> 1) Determine if the waste is excluded under (40 CFR 261.4) 2) Determine if the waste is listed as a hazardous waste in 40 CFR 261, Subpart D 3) For the purposes of compliance with 40 CFR part 268, or if the waste is not listed in subpart D of 40 CFR part 261, the generator must then determine whether the waste is identified in subpart C (characteristic) of 40 CFR part 261. <p>IDAPA 58.01.05.006 {40 CFR 262.11}</p>	<p>Any waste streams generated during the remediation process for storage and/or disposal will have a hazardous waste determination performed. If needed, sampling will be conducted in accordance with a task specific sampling and analysis plan. All generated waste will be packaged, handled, and stored in accordance with the Phase C Waste Management Plan. Waste minimization activities will be implemented in accordance with the INEEL Reusable Property, Recycle Materials and Waste Acceptance Criteria. Trained personnel will inspect and ensure the CERCLA Waste Storage Unites are in compliance with all applicable regulations.</p>

Table A-1. (continued).

Category	Type	Regulatory Requirements	Implementation Strategy
General Waste Analysis	Action	<p>General facility standards require that operators of a facility must obtain chemical and physical analyses of a representative sample of each hazardous waste to be treated, stored, or disposed of at the facility prior to treatment, storage, or disposal. The analysis may include existing published or documented data on the hazardous waste or on hazardous waste generated from a similar processes. At a minimum, the analysis must contain all the information which must be known to treat, store, or dispose of the waste in accordance with this part and part 268 of this chapter.</p> <p>IDAPA 58.01.05.008 {40 CFR 264.13}</p>	<p>Waste stream management requirements are based on a waste evaluation supported by a project sampling and analysis plan and/or process knowledge. This information will provide the basis for determining: container requirements, storage and disposal requirements, labeling requirements, and treatment and VOC) generated during remediation operations will be managed through facility procedures in accordance with the Phase C Waste Management Plan.</p>
General Facility Standards (Site Selection)	Location	<p>Seismic considerations for portions of new facilities where treatment, storage, or disposal of hazardous waste will be conducted must not be located within 61 meters (200 feet) of a fault which has had displacement in Holocene time. A facility located in a 100-year floodplain must be designed, constructed, operated, and maintained to prevent washout or any hazardous waste by a 100-year flood, unless the owner or operator can demonstrate to the Regional Administrator's satisfaction that:</p> <p>(i) Procedures are in effect which will cause the waste to be removed safely, before flood waters can reach the facility, to a location where the wastes will not be vulnerable to flood waters; or</p> <p>(ii) For existing surface impoundments, waste piles, land treatment units, landfills, and miscellaneous units, no adverse effects on human health or the environment will result if washout occurs.</p> <p>IDAPA 58.01.05.008 [40 CFR 264.18(a) and (b)]</p>	<p>Construction activities involving siting a facility will take into consideration:</p> <ul style="list-style-type: none"> · Site hydrology, geology, and waste characteristics; · Compliance with the NEPA process; · Potential sites must be evaluated for natural hazards such as floods, erosion, tornadoes, earthquakes, and volcanoes; · Areas subject to surface geological processes (i.e., mass wasting, erosion, slumping, landslides, and weathering) which significantly affect the ability of the disposal facility to meet the performance objectives will be avoided. <p>Current area designations show that the 1-07B Project Area is not within a 100 year floodplain.</p>
General Facility Standards (Preparedness and Prevention)	Action	<p>Treatment, Storage, and Disposal (TSD) operators must design, construct, maintain and operate facilities to minimize the possibility of fire, explosion or any unplanned sudden or non-sudden release of hazardous waste to air, soil, or surface water which might threaten human health or the environment.</p> <p>IDAPA 58.01.05.008 {40 CFR 264.31 through .35 and .37}</p>	<p>New and existing facilities will continue to be designed, inspected and operated in compliance with site procedures and the requirements of this section. New treatment systems and any modifications to existing facilities as well as current operations will consider the design and operational requirements of these sections when developing the design requirements.</p>

Table A-1. (continued).

Category	Type	Regulatory Requirements	Implementation Strategy
Closure Performance Standards	Action	<p>The owner or operator must close the facility in a manner that:</p> <ol style="list-style-type: none"> 1) Minimizes the need for further maintenance, 2) Controls, minimizes or eliminates, to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products to the ground or surface waters or to the atmosphere, and 3) Complies with the closure requirements of this subpart. <p>IDAPA 58.01.05.008 {40 CFR 264.111}</p> <p>During the partial and final closure periods, all contaminated equipment, structures and soils must be properly disposed of or decontaminated unless otherwise specified in Sections 264.197, 264.228, 264.258, 264.280 or Section 264.310. By removing any hazardous wastes or hazardous constituents during partial and final closure, the owner or operator may become a generator of hazardous waste and must handle that waste in accordance with all applicable requirements of part 262 of this chapter.</p> <p>IDAPA 58.01.05.008 {40 CFR 264.114}</p>	<p>Once remediation activities have achieved compliance with remediation goals, closure procedures will be implemented. An evaluation of the equipment and storage areas will determine closure requirements and management of the materials, pump and treat equipment, and associated ancillary piping. Emphasis will be placed on minimal site O&M at completion of closure.</p> <p>All equipment, materials, and associated debris generated during project closure will be adequately characterized to determine waste management requirements.</p>

Table A-1. (continued).

Category	Type	Regulatory Requirements	Implementation Strategy
Container Management	Action	<ul style="list-style-type: none"> 1) Remediation wastes will be kept in containers meeting the requirements of 40 CFR 264.171; 2) Wastes will be stored with compatible containers; 3) Containers will be properly managed; and 4) The storage facility will be subject to inspections under 40 CFR 264.174. 5) The storage area containment system will be in accordance with 40 CFR 264.175. 	Characterization results via process knowledge or analytical results will dictate the packaging requirements, determine storage requirements, and compatibility with other wastes. Waste containers will be properly labeled and managed in accordance with existing operating procedures. All containerized waste will be subject to RCRA storage facility inspection requirements. If required, the storage containers will be stored within the CERCLA Waste Storage Area.
		IDAPA 58.01.05.008 {40 CFR 264 Subpart I}	Containers used to transport water extracted during groundwater sampling, will not be double walled containers. If water is stored in these containers (>3 days) they will be placed in a container storage area with secondary containment.
Tank Systems			Any new treatment systems and any future facility modifications will be designed to provide adequate containment.
			These requirements will be covered and implemented through the Phase C Waste Management Plan and respective Phase C Remedial Designs
	Action	<p>The tank system utilized in processing the remediation waste streams generated during remediation operations will comply with the tank system requirements under 40 CFR 264 Subpart J which includes:</p> <ul style="list-style-type: none"> 1) Assessment of the tank's system integrity; 2) Containment and detection of releases; 3) General operating requirements; 4) Inspections; 5) Response to leaks or spills; and 6) Closure and Post-Closure care. <p>IDAPA 58.01.05.008 {40 CFR 264 Subpart J}</p>	<p>The tank systems will be inspected once per operating day. The inspection will check for visible and leakage and signs of corrosion, and will also check the leak detection system for indications of leakage.</p> <p>Any new treatment systems and any future facility modifications will be designed to address the need for adequate containment and regulatory requirements.</p> <p>Any new tanks used in new remediation facilities that are designated as a tank system, will be certified by an independent qualified registered professional engineer attesting that the tank system has sufficient structural integrity and is acceptable for storing and treating hazardous waste.</p>

Table A-1. (continued).

Category	Type	Regulatory Requirements	Implementation Strategy
Land Disposal Restrictions	Action	<p>IDAPA Regulation 58.01.05.011 identifies that all of 40 CFR Part 268 and all Subparts are herein incorporated by reference as provided in 40 CFR, revised as of July 1, 1994, except for 40 CFR Parts 268.5, 268.6, 268.42(b) and 268.44. Except as specifically provided otherwise in this part or part 261 of this chapter, the requirements of this part apply to persons who generate or transport hazardous waste and owners and operators of hazardous waste treatment, storage, and disposal facilities. Restricted wastes may continue to be land disposed as follows:</p> <ol style="list-style-type: none"> 1) Where persons have been granted an extension to the effective date of a prohibition under subpart C of this part or pursuant to Section 268.5, with respect to those wastes covered by the extension; 2) Where persons have been granted an exemption from a prohibition pursuant to a petition under Section 268.6, with respect to those wastes and units covered by the petition; 3) Wastes that are hazardous only because they exhibit a hazardous characteristic, and which are otherwise prohibited from land disposal under this part, are not prohibited from land disposal if the wastes: <ol style="list-style-type: none"> a) Are disposed into a nonhazardous or hazardous injection well as defined in 40 CFR 144.6(a); and b) Do not exhibit any prohibited characteristic of hazardous waste at the point of injection; and c) If at the point of generation the injected wastes include D001 High TOC subcategory wastes or D012-D017 pesticide wastes that are prohibited under Section 148.17(c) of this chapter, those wastes have been treated to meet the treatment standards of Section 268.40 before injection. <p>IDAPA 58.01.05.011</p>	<p>Wastes generated as a result of remediation efforts will be characterized for determining management requirements. Additionally, each waste stream will be evaluated to determine the applicability of LDRs. Waste streams subject to LDRs will be segregated and consolidated with compatible waste streams, as appropriate, when similar treatment technologies can be utilized. Waste streams generated from implementation of treatment technologies will be captured and appropriately managed based on classification.</p>
Water Quality	Action	<p>Contaminated groundwater may not be injected back into the aquifer in which it came unless the groundwater is treated to substantially reduce hazard constituents prior to such reinjection.</p> <p>Section 3020 of RCRA.</p>	<p>Any extracted groundwater obtained during performance of the OU 1-07B remedial activities will be processed through the NPTF prior to reinjection. Processing through the NPTF will substantially reduce the hazardous constituents.</p>

Table A-1. (continued).

Category	Type	Regulatory Requirements	Implementation Strategy
Water Quality (Underground Injection Control)	Action	No chemical contaminants at concentrations above MCLs, or above the contaminant concentration of the receiving water can be injected into the aquifer. No radionuclides above MCLs, or hazardous waste, can be injected into the aquifer. IDAPA 37.03.03	The design of the NPTF has incorporated the substantive requirements specified within this IDAPA regulation.
Water Quality (Monitoring)	Action	Monitoring, record keeping and reporting may be required if the well could adversely affect a drinking water source or if injecting a contaminant that could have an unacceptable effect upon the quality of the groundwaters of the state. The state may require where appropriate, but is not limited to, the following: 1) Any injection authorized by the state shall be subject to monitoring and record keeping requirements as conditions of the permit; 2) The frequency of required monitoring shall be specified in the permit; 3) All monitoring tests and analysis required by permit conditions shall be performed in a state certified laboratory or other laboratory approved by the state; 4) Any field instrumentation used to gather data, when specified as a condition of the permit, shall be tested and maintained in such a manner as to ensure the accuracy of the data; and 5) All samples and measurements taken for the purpose of monitoring shall be representative of the monitoring activity and fluids injected. IDAPA 37.03.03.055.01	Any systems or components that inject materials into the aquifer during the remedial activities will meet these requirements as established in the individual work plans. Periodic monitoring will be performed to show compliance with this regulation.

Table A-1. (continued).

Category	Type	Regulatory Requirements	Implementation Strategy
Drinking Water Standards (MCLs)	Chemical	The following are the MCLs per Federal and State drinking water standards, in effect on the date of the original ROD signature.	<p>If any new radionuclides are identified without existing MCLs, calculations will be performed to estimate radionuclide uptake. Then a back calculation to determine maximum radionuclide activities will be performed, and annual maximum inputs determined.</p> <p>Groundwater monitoring will be performed to collect data to monitor the progress of cleaning the contaminated plume to concentrations below MCLs.</p> <p>Secondary MCLs were developed as aesthetic guidelines for the public acceptance of drinking water and are not federally enforceable. These secondary groundwater quality standards must be achieved at the completion of the restoration time frame, which is specified as year 2095. Therefore, although concentrations of manganese or other treatment agents in or near the hot spot or reactive zone may exceed the secondary MCLs as a result of implementing the hot spot remedy, this excursion is acceptable because the hot spot and medial zones are not currently drinking water sources. In situ bioremediation is being implemented to remove TCE in an attempt to restore the aquifer to drinking water quality within the 2095 timeframe. Therefore, it is not appropriate to apply secondary MCLs before the end of the restoration period. Institutional controls are part of the remedial action and will be protective of human health and the environment during the restoration time frame.</p>
		Organics	
		MCL (µg/L)	
		PCE	
		TCE	
		cis-DCE	
Historic Preservation	Location	trans-DCE	<p>All areas within the hot spot and medial zone have been surveyed and evaluated for historical preservation resources. Any siting of new facilities or wells will be surveyed and evaluated to determine if there will be any impacts to historical sites.</p>
		The average annual concentration of beta particle and photon radioactivity from man-made radionuclides in drinking water shall not produce an annual dose equivalent to the total body or any internal organ greater than 4 mrem/year.	
		Radionuclides	
		MCL (pCi/L)	
		Cesium-137	
		119	
		Tritium	
		20,000	
		Strontium-90	
		8	
Historic Preservation	Location	Uranium-234	<p>30 pCi (proposed)</p> <p>IDAPA 58.01.08.050.02 and .05 {40 CFR 141.12 and .16}</p> <p>The State of Idaho Secondary Drinking Water Standards (IDAPA 58.01.08.400.03) are a Chemical-Specific ARAR. These standards establish primary and secondary MCLs. Secondary MCLs are a consideration for in situ bioremediation because the implementation will involve the injection of treatment agents (i.e., nutrients). These treatment agents may initially exceed the established secondary MCLs.</p>
		IDAPA 58.01.08.400.03	
		The Secretary of the Interior must be notified in writing whenever DOE finds or is notified in writing by an appropriate historical or archaeological authority that the activities in connection with a project may cause irreparable loss or destruction of significant scientific, prehistorical, historical, or archaeological data. The DOE or the Department of Interior must preserve any data that may be lost or destroyed.	
		36 CFR 800.4(a)(1)(i),(iii)(a)(2)	
		36 CFR 800.4(b)	